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Light and Lighting

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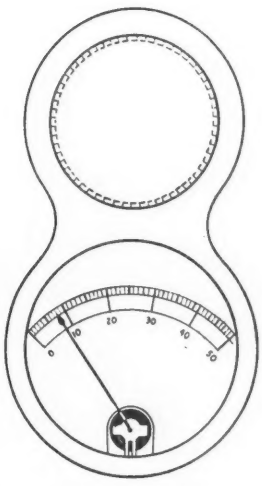
HOTEL LIGHTING



8 FOOTCANDLES

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ORPORATING "THE ILLUMINATING ENGINEER"

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Staines Urban District Council has decided on a 5-year contract for the public lighting of the Laleham Ward by gas.

This follows on a previous 3-year contract.

The number of lamps has been increased—they are all clock controlled, inspected every night and regularly cleaned.

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OSIRA High Pressure Mercury Vapour Electric Discharge Lamps and G.E.C. Lanterns have proved themselves so successful in helping to make roads safer in Lambeth that, in six months, the installation has been increased from 490 units to its present day total of 1,500 units—proof of the reliability of OSIRA Lamps and G.E.C. Lanterns.

OSIRA LAMPS FOR ACCIDENT-PROOF STREET LIGHTING

Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2.

BETTER LIGHT BETTER SIGHT

STREET LIGHTING

The tremendous economy of electric discharge lamps over other forms of illuminant for street lighting is sufficiently well known to need no stressing. Other points in their favour include less liability to damage from vibration, long life and less sensitivity to voltage variation. In addition, the colour of Mercury Discharge lamps is undergoing steady improvement.

Further research by the Lamp Manufacturers associated in E. L. M. A. will enable them to improve yet further the electric discharge lamp. In street lighting, as in other spheres where artificial lighting is of paramount importance, the E.L.M.A. will continue to seek new ways and means of producing better, safer and cheaper light.

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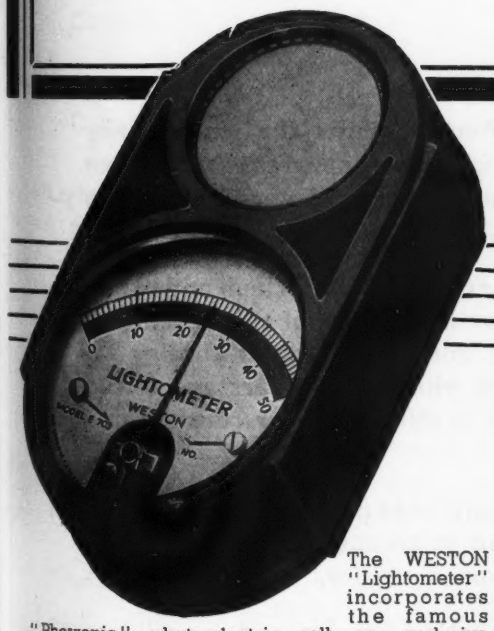
Take this handy little instrument round in your pocket. You can use it dozens of times daily and get additional orders for light equipment.



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The modern bathroom needs good diffused lighting to show its cleanliness to the best advantage.
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STRETCHING DAYLIGHT.
Now, when the daylight hours grow shorter, when "Summer-time" is a thing of the past and when industry is striving for better and greater output,
BENJAMIN
INDUSTRIAL LIGHTING
is necessary.
is more than helpful—it
It is decreasing accident, spoilage and waste, and increasing output for hundreds of factories in this country. It raises production to daylight level and keeps it there. Correct Industrial Illumination does not necessitate the costly installation of special plant, but consists solely of the economical use of suitable lamps in correctly designed reflectors—our speciality.
Our Illuminating Engineers are always ready to assist works owners, architects, contractors, &c., in the proper selection of reflectors—without obligation, of course.
THE BENJAMIN ELECTRIC Ltd.
Brantwood Works, Tottenham, N.17.
BENJAMIN PRODUCTS

HOW MANY *remember* THIS *Advertisement* ?

A Benjamin advertisement which appeared in the "Electrical Review," and other papers in the Autumn of 1921.

BENJAMIN was preaching the Gospel of Better Industrial Lighting many years before ever the above advertisement appeared, have been preaching it ever since and will continue to preach it until Industry as a whole appreciates the advantages of correctly planned Industrial Lighting.

The message contained in its heading is as true to-day as then and while employers, generally, now have a much clearer conception of the benefits to be obtained from adequate artificial lighting, and are rapidly becoming accustomed to, and even demanding, intensities which a few years ago would have been considered inordinately high, there is still room for considerable improvement.

BENJAMIN PLANNED LIGHTING has not only kept pace with this natural development, but, by keeping just a bit ahead of accepted practice, has set standards which form a true indication of future necessity.

Co-operate with Benjamin Illuminating Engineering Service and consolidate your reputation.

BENJAMIN PLANNED LIGHTING

THE BENJAMIN ELECTRIC LTD., BRANTWOOD WORKS, TOTTENHAM, N.17

Incorporating "The Illuminating Engineer."

Light and Lighting

Official Journal of the Illuminating Engineering Society.

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Visibility

MENTION the word "visibility" and the average lighting expert will look at you askance. He knows how many different meanings are attached to this term, how often it has figured in confusing arguments and loose descriptions.

The Brethren of Trinity House have a very fair idea of what *they* mean by visibility, when applied to the effect of mist and fog, for example, in specifying the distance at which beacons can be seen. But this is not at all what the illuminating engineer means by "visibility."

There is, as yet, no recognised definition of the term, and no standard method of measuring it, yet this quality of visibility is precisely what nine-tenths of our lighting is intended to give us.

As an approximation we might say that in illuminating engineering "visibility" implies the ease with which illuminated objects (whether on the roadway, the racing track or the theatre) can be seen. It is therefore a quality conferred by the lighting installation—it is not a characteristic of the illuminant. (We have occasionally heard manufacturers referring proudly to the good visibility of their system of lighting—which is rather like saying that the plum pudding has an excellent Christmas Dinner.)

It should not be too difficult to frame an acceptable definition of visibility, in the sense demanded by illuminating engineers. It is much more difficult to devise a reasonably simple and accurate method of measuring this quality.

Nevertheless a most important task—**Get Down To it!**

N.S.F.A.; Public Lighting Session — Street Lighting in Oldham — Telescopic Lamp-Standards—Illuminations at Portsmouth—Sodium Lamps for Lighthouses—A.P.L.E. Conference in Folkestone—East Lancashire Road Lighting.

National Safety First Association

Forthcoming Public Lighting Session

We hear that the National Safety First Association, in accordance with past practice, is arranging a session on public lighting in connection with the conference to be held in London in October next. The session will take place on the afternoon of October 8, and will follow others concerned with road surfacing materials, etc. An address on the subject of Lighting for Speed and Safety is to be delivered by Mr. Arthur Cunnington, who will no doubt draw upon his experience of railway lighting and deal with the subject on broad and general lines. Following the address there will be some discussion, and it is hoped that several films conveying useful lessons in regard to visibility in streets will be shown. Immediately after the afternoon proceedings it is planned to arrange a short motor tour of London streets, enabling interesting examples of lighting, both gas and electric, to be seen. Members of the Illuminating Engineering Society and the Association of Public Lighting Engineers will be welcome at this meeting, of which fuller details will be announced in due course.

Forthcoming B.C.G.A. Conference

Over 400 delegates from all parts of Great Britain and Ireland are expected to attend the forthcoming annual conference of the British Commercial Gas Association to be held during September 26—29. After twenty-five years the conference is returning to Manchester, where the first meeting was held, in 1912. The business of the meeting is to be enlivened by several agreeable excursions, including tours of the Lake District or Blackpool, a trip on the Ship Canal, and a visit to Trafford Park.

Street Lighting in Oldham

In a foreword to the annual report of the lighting superintendent for Oldham, the chairman of the Lighting Committee (Mr. J. R. Buckley) emphasises the importance attached to lighting in the interests of safety, and the consciousness of members of the Lighting Committee of "the responsibility which falls upon them in providing reasonable safety during artificial lighting hours." As an earnest of these good intentions, it is stated in the report that the drastic cuts in street lighting imposed a few years ago have to some extent been reinstated, and the hours of lighting have been increased by fifty-one hours. The records show that the candle-power per head of population has again sharply risen, and for 1937 is 9.39—though even now it is not completely restored to the figure (10.1) before the grievous cut in 1933 was made. The consumption of both gas and electricity has also increased. In one respect Oldham has certainly been fortunate, in that the cost of both these commodities for public lighting has fallen very considerably since 1924—in the case of gas from 3s. 2d. to 1s. 8d. per 1,000 cubic feet, and in the case of electricity from 2d. to 1d. a unit. In a number of streets the lighting has been improved, and in the case of a certain footbridge the railway company were requested to improve the burner capacity and fix new lanterns, as only the lighting and cleaning of these lamps is done by the Lighting Committee—surely rather an odd arrangement.

I.E.S. Annual Convention (U.S.A.)

The coming annual convention of the Illuminating Engineering Society (U.S.A.), to be held in Buffalo during August 31 to September 3, is the thirtieth of the series. From all accounts the conference will be an exceptionally busy one, and the array of papers, which will appear in due course in "Transactions," is imposing. The need for such an annual convention is naturally greater in the States, where such big distances have to be covered. Nevertheless we hope that our Society, which is busy creating new local centres, will do something similar in time to come.

Telescopic Lamp-Standards

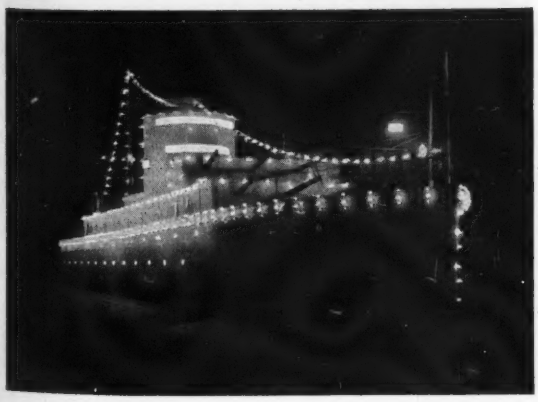
According to "Lux" an original method of solving a problem in public lighting is now being tried out in the Place de la Concorde, Paris. The ornamentation of this fine square dates from the days of Louis Philippe. The tall central obelisk was erected in 1836 and the gas candelabra, 220 in number, are of the same period. It is stated that incandescent mantles were not introduced in the candelabra until 1910, flat flame burners being presumably used prior to that date.

This multitude of lights was intended to produce a certain grandeur of effect, but owing to the low height of the candelabra they do not serve at all well to illuminate such a large area. Efforts have accordingly been made to substitute a smaller number of more powerful units on high masts, such as would enable the area to be lighted more successfully according to modern notions. It was evident, however, that, for such a large area, only masts of exceptional height (at least 30 m.) would answer, and that such posts would, in the only feasible positions for them, prove very unsightly during the day.

Recourse was accordingly had to the ingenious expedient of designing the posts in three telescopic sections, which collapse one within the other and are then drawn within a fourth outer covering, the base of which is sunk 12 metres into the earth. A motor in the base of the apparatus achieves the raising and lowering.

By night, therefore, we have a powerful unit at the top of a very high mast but during the day a relatively inconspicuous object, somewhat resembling a pillar-box in shape. Each lantern, 3½ metres high, contains three 220 volt 1,500 watt lamps; the consumption per post is 9 kW.

Illuminations at Portsmouth



A correspondent sends us one additional picture of Coronation lighting—the above view of the large model of an illuminated battleship which figured in the Guildhall Square at Portsmouth. The model was 163 feet long. It was lighted by 800 lamps in strips and by nine floodlights mounted on the adjacent trolley-bus standards. This was, of course, in addition to the ordinary lighting of the square which is by electric discharge lamps.

Sodium Lamps for Lighthouses

The possibilities of the electric discharge lamps for different fields of work are being actively studied. An instance is afforded, a correspondent informs us, by the decision of the United States Department of Commerce to experiment with a sodium lamp installation in the lighthouse at Cape May Point, New Jersey, at the entrance to Delaware Bay. The Cape May lighthouse was erected in 1859. Its light source is 165 feet above mean high water and it can be seen from a distance of about nineteen miles under clear atmospheric conditions. The lighthouse is provided with a first order 16-panel motor-driven flashing lens. The beam of light has a 4-second flash and a 26-second eclipse, the source of light, of course, being kept alight continuously.

A.P.L.E. Conference in Folkestone

With further reference to the note on the above conference, which appeared in our last issue, we learn that although there is no exhibition of lamps and appliances this year, the display of outdoor lighting, both gas and electric, is to be exceptionally complete. We understand that several hundred special lamp-posts are to be erected within an area of about one square mile where the display is concentrated, and that some of the leading thoroughfares will be completely relighted for the occasion.

It is also interesting to note that Mr. C. I. Winstone, Public Lighting Superintendent of the Gas Light and Coke Company, will enter on his term of office as President of the Association at the Folkestone conference. We are sure that many of our readers will join us in congratulating Mr. Winstone on this well-deserved recognition.

East Lancashire Road Lighting

According to the "Wigan Observer," Mr. Tinker (Leigh, Labour) recently asked the Minister of Transport what progress had been made with the lighting of the new East Lancashire road from Liverpool to Manchester, and when the whole length would be completed.

Mr. Hore-Belisha: There is lighting at the nine principal junctions, and the portions in Liverpool and Swinton and Pendlebury are lit. I cannot say when lighting will be provided on the rest of the road.

Mr. Tinker: Will the Minister try to get it completed before winter?

Mr. Hore-Belisha: I am aware of my hon friend's continuous interest in this matter, but he knows that before I can do anything I must have the report of the Departmental Committee on Road Lighting.

Notes on The International Congress on Applied Lighting Practice, Paris, June 24-29, 1937

(Specially Contributed.)

It is but fitting that one of the 150 international congresses and conferences being held this year in Paris should have been devoted to the subject of illumination. Quite apart from the importance of the subject in itself, novel lighting effects figure so largely among the attractions of the International Exhibition, that it would have been a most noticeable omission if lighting had not found its place among the subjects which experts from all nations have gathered in Paris to discuss during the past few months.

Festive Lighting in Paris.

A great deal of work and ingenuity has been devoted to the design of the numerous striking lighting schemes within the Exhibition grounds, but in addition to these there are some notable examples of the use of lighting for festive effect in Paris itself. The Place de la Concorde, for instance, with its brightly illuminated fountains and monuments, is a wonderfully attractive sight after dark. Very charming, too, is the new lighting in the Champs-Elysées; the spherical units, mounted fairly low, emit ordinary white light in the lower hemisphere for the illumination of the paths and passers-by, but the light emitted upwards has that greenish colour, associated with mercury discharge lamps, which produces such a fairyland effect in the branches of trees in full leaf. Another example of special lighting is that in the Ave. du Président Wilson, where the lighting columns are themselves lighted from below by lamps concealed in the bases of the columns. These and other special forms of street lighting to be seen in Paris this year were described by A. Janet in a paper read before the Congress (see below).

The Exhibition.

Inside the Exhibition area the most noteworthy lighting effects can be seen by starting from the Trocadéro entrance, passing over the widened Pont d'Iéna towards the Eiffel Tower and then turning left along the transformed Quai d'Orsay. The scene from the top of the terrace just inside the Trocadéro entrance is very fine indeed. The photograph (Fig. 1) completely fails to do justice to the beauty of the illuminated fountains in the foreground, and of the national flags, each lighted by its own projector, on the left. The two large pavilions of Germany (left) and U.S.S.R. (right) are floodlighted very effectively, while in the background there is the Eiffel Tower, sometimes amber, sometimes a faint green, and having at its base a really marvellous design in luminous discharge tubes of many colours. Some idea of this can be obtained from the photograph (Fig. 2) taken from ground level with the camera tilted upward.

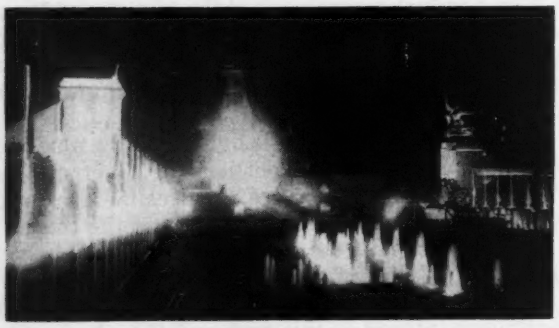


Fig. 1. A general view from the Trocadéro, looking towards the Eiffel Tower.

The beautiful avenue of the Quai d'Orsay, much of which is enclosed within the Exhibition area, is lighted, partly by sodium and mercury lamps placed within the trees themselves and producing an alternately vernal and autumnal effect, and partly by large ornamental fittings suspended over the roadway and rather reminiscent of the more ornate fixtures of Japanese design. The Pont Alexandre III is lined on each side with ornate columns, lighted at night (as shown in Fig. 3), and discoursing music (of a loudness, unfortunately, not readily compatible with sweetness) to visitors, whether afoot on the banks or afloat on the vedettes which ply the whole length of the Seine, included within the limits of the Exhibition.

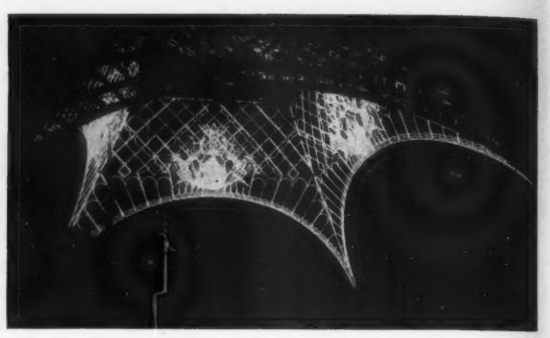


Fig. 2. Display of Luminous Tubes beneath lowest platform of the Eiffel Tower.

Passing from the spectacular to the educational, it is interesting to note that the very fine exhibition of scientific research and invention, shown in the Grand Palais, has a section devoted to the principles of optics and their application to the design of lighting fittings, as well as exhibits illustrating the more general aspects of illuminating engineering. The range of this exhibit is thus a wide one, and it illustrates the advantages of associating kindred topics with those of special interest to illuminating engineers.

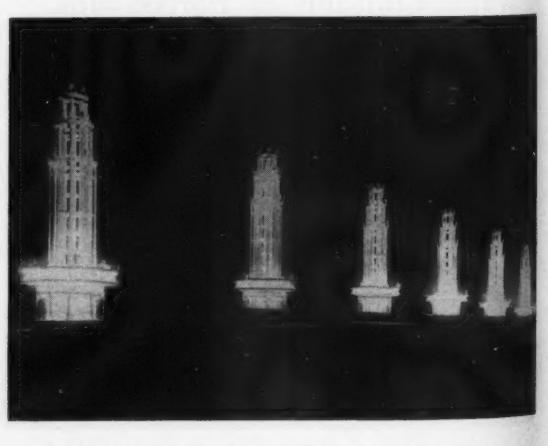


Fig. 3. Luminous Pylons on the Pont Alexandre III.

The Lighting Congress.

The lighting congress or, to quote the official title, the "Congrès International des Applications de l'Eclairage," was held under the presidency of M. R de Valbreuze in the Salle d'Iéna, situated in the Avenue d'Iéna close to the reconstructed Trocadéro. It was attended by over 300 delegates from some twenty different nations, and a number of useful and informative papers were presented.

The technical programme was opened on Thursday morning, June 24, with a lecture by Prof. Ch. Fabry (President of the International Commission on Illumination) on "Light and Colour," delivered in M. Fabry's inimitably lucid style. As indicated by the title, the field covered was a very wide one. Modern developments in light production, notably the use of the electrical discharge through gases, were naturally given prominent notice. The increasing application of fluorescence in practical light sources was referred to as an example of the possibilities offered by the atomic conversion of energy in the direction of producing "cold light," i.e., radiation confined to the visible part of the spectrum.

Public Lighting.

The afternoon of Thursday was devoted to a session on street lighting which was fittingly opened by M. Merry Cohu, whose paper before the Illuminating Engineering Society about a year ago will be well remembered by many of our readers. M. Cohu dealt with the various factors affecting the visibility of objects on the highway and emphasised the importance of a high degree of contrast between the brightness of the street surface and that of the objects to be seen by silhouette against it. In a paper by R. Nampon, various methods of calculating curves of equal brightness on the roadway were described, while G. Peri dealt with the avoidance of glare in street lighting by the use of highly diffusing fittings. Descriptions of outstanding installations were given by J. Chanteux (Lighting of the Brussels-Antwerp arterial road), A. Janet (Public lighting in Paris), L. Rançon (Gas-lighted traffic signs), A. Pux and R. Vialatel (Lighting in the environs of Paris). The presentation of these papers was followed by a very lively and interesting discussion.

On Friday, two technical sessions were held. In the morning the subjects discussed were light sources and luminaires. C. A. Atherton gave a general description of the present position as regards electric light sources, while A. Claude dealt with the possibilities of discharge tube lighting, particularly the production of artificial daylight and the decorative use of the recently developed "pastel shades" employed with such effect in the display at the base of the Eiffel Tower (noticed earlier in this article). P. Meystre described two installations in Lausanne in which use was made of the mixed light from red and green high voltage discharge tubes, L. Morati discussed the economy of lighting by means of low-voltage (e.g., 20-volt) lamps, and finally, H. Maisonneuve and J. Wetzel gave a most interesting survey of the use of decorative (including built-in) fittings for interior lighting. This paper was illustrated with a large number of photographs of outstanding installations.

The afternoon session was more theoretical in character; R. Pagès dealt with the design of the reflecting and refracting elements in lighting fittings, P. Cibié outlined the principles of headlight design, while A. Vallat compared the various methods in use for the calculation of utilization factors. Two papers, one by Prof. J. Ondracek and the other by A. Gouffé, dealt with methods of calculating the illumination from luminous sources of extended area. (These papers, as well as that by R. Nampon noted above, have already been published in full in the Revue Générale d'Electricité for July, 1937.) The measurement of spatial illumination (i.e., illumination irrespective of direction) was the subject of a paper by D. Matanovic, who described an instrument consisting of a number of photocells disposed about the sides of a cube. Three papers were presented by M. Dourgnon in the absence of the authors. The first, by Z. Yamauti, treated the problem of repeated reflection within a cylinder of infinite length, while the other two, by Prof. A. Gersun, dealt respectively with the vectorial method as applied to various types of illumination calculations and with methods of calculating and measuring spatial illumination.

Industrial and School Lighting.

On Saturday morning the session was divided into two parts dealing respectively with daylight and with industrial and school lighting. The first paper, by P. J. Waldram (the only English author to present a paper), described progress in the measurement and calculation of daylight in interiors. Dr. J. Escher-Desrivières then dealt with the absorption of the invisible radiation in sunlight by glass of various kinds, referring in particular to the use of ultra-violet transmitting glasses and to the glasses which give protection from infra-red radiation. J. Dourgnon gave a general survey of the subject and its present state of development in France.

The second part of the session was occupied with the presentation and discussion of two of the four papers on the programme, the other two not being presented owing to the absence of the authors. W. C. Brown's paper (read by A. L. Powell) gave an account of recent investigations in the United States on the illumination most suitable for various industrial processes, and this was followed by a paper by L. Schneider on methods of improving conditions of seeing in industrial processes of unusually exacting kinds. In particular, he referred to the special types of lighting required for the examination of fine detail in cloth, and for the detection of faults in polished surfaces such as stainless steel sheet. The two papers not read dealt with the lighting of schools. The first, by J. Guanter and C. Schedler, described some experiments on classroom lighting at Zurich, while the other, by H. Hofstetter, dealt with various methods of lighting classrooms, art rooms, gymnasia, and other rooms for special purposes.

Light in Medicine and Surgery.

The afternoon session on Saturday was devoted to papers dealing with various aspects of the application of light in medicine and surgery. The lighting of operating theatres naturally occupied a prominent part in the programme, no fewer than four papers being devoted to this subject. Dr. P. Wilmoth described some of the methods used at the present time, and referred to a novel proposed method in which the light source was placed outside the operating theatre. Dr. R. Latarjet gave an account of the measurements which could be made by any surgeon interested in comparing different systems as regards, for instance, their suitability for illuminating a deep cavity. The principles of producing a "shadowless" illumination were set out in a paper by the Société pour le Perfectionnement de l'Eclairage, while R. Pagès described the system of lighting in the operating theatre shown at the Exhibition (Section of Invention and Discovery). Dr. J. A. Ramadier read a paper dealing with the illumination of the ear, nose, and larynx, while Dr. R. Ledoux-Lebard gave an intersting contribution on the subject of radioscopy. He described a system by which it was possible to carry out radioscopic examinations in a room glazed with a neodymium glass. A glass which absorbs the light transmitted by this glazing,

Fig. 4. Church of St. Maclou, Rouen, floodlighted.

but does not absorb the light from the X-ray screen, is placed between the observer and the screen, and in this way the necessity for working in a darkened room, with all its attendant dangers, is avoided.

No technical session was held on the morning of Monday, July 28, so that delegates might be free to attend the "Better Lighting" propaganda meeting arranged by the Association des Ingénieurs de l'Eclairage. This campaign was largely concerned with domestic lighting, and a number of very interesting papers were read by women responsible for the promotion of better lighting in various countries. We are pleased to note that among these was a paper by Miss C. Haslett on "Women's Contribution to Lighting Education in Great Britain."

Lighting for Fêtes and Exhibitions.

The seventh and last technical session of the Congress, on Monday afternoon, was held jointly with an international gathering of architects, and the papers presented dealt with the use of lighting for fêtes and exhibitions, and with the decorative lighting of the exteriors of buildings. E. Beaudouin described the special lighting effects used on the Seine during the Exhibition, particularly the illuminated smoke plumes and water jets and the sound apparatus worked in conjunction with the lighting "score" during the "Gala de la Lumière" Marcel Lods gave a description of the floating mechanism used for producing these various effects, a feature of special interest being the floating control barge which contained apparatus enabling the colours of the lights to be changed at will by an operator manipulating a type of organ "console." A. Granet, A. Salomon, and A. Pux described other sections of the very elaborate lighting plant, including that used for the floodlighting of the Eiffel Tower. (Some of these papers have already appeared in full in the "Revue Générale d'Electricité.)

In the second part of the session N. A. Halbertsma gave a paper on recent developments in the floodlighting of buildings, while L. Kalff dealt with the necessity for a close co-operation between the architect and the illuminating engineer if aesthetically satisfying results were to be obtained. An interesting paper by Yvon Laure, in which he described various types of gas-lighted projectors for floodlighting, concluded the technical programme.

Social Events.

The social functions usually associated with international gatherings were not omitted on this occasion. The ladies had a delightful visit to an exhibition of modern art on Thursday afternoon, June 24, and a tour of the Exhibition by water on the following morning. All the members of the congress were accorded the unusual privilege of an evening visit to the Louvre. This took place on the Thursday evening and was much enjoyed by all who participated in it. The recently installed artificial lighting of the sculpture galleries was the subject of much favourable comment: it was remarked that in some cases the modelling was seen to better advantage by the artificial light than by daylight.

On Friday evening the "Gala de la Lumière" took place in the Exhibition and was witnessed by the delegates from the terrace of the German pavilion. The illuminated fountains and smoke plumes rising from floats on the river near the Pont d'Alma were much admired as they changed in form and colour to give a succession of harmonious combinations. A fine display of fireworks formed part of the entertainment, while sound effects and musical accompaniment from amplifiers at various points combined to give the programme some resemblance to a ballet in which the performers were delicate streamers of luminous mist. Needless to say, the Gala attracted a large crowd of spectators, most of the visitors to the Exhibition on that evening assembling in front of the Belgian pavilion, on the Pont d'Iéna or at any other open space from which a good view of the spectacle could be obtained.

On Monday and Tuesday, visits were arranged to view the electrical installation at the Exhibition, and the special features described in the papers which had been read before the Congress on the Monday afternoon. These visits were of considerable interest to a large number of the delegates and the ingenuity displayed was much admired. The congress closed officially on the Monday evening

Fig. 5. Gros Horloge, Rouen, by night.

with a banquet held at the Palais d'Orsay under the presidency of M. de Valbreuze, who referred in enthusiastic terms to the great strides made in the past 15 years by the science of illumination. Appreciation of the work done by those responsible for the organisation of the congress was expressed, on behalf of the visiting delegations, by W. Bache (Gt. Britain), A. L. Powell (U.S.A.), L. Schneider (Germany), and T. Lousberg (Belgium).

A Visit to Rouen.

Although not officially part of the congress programme, a most enjoyable trip was arranged for the delegates on the evening of Tuesday, June 29.

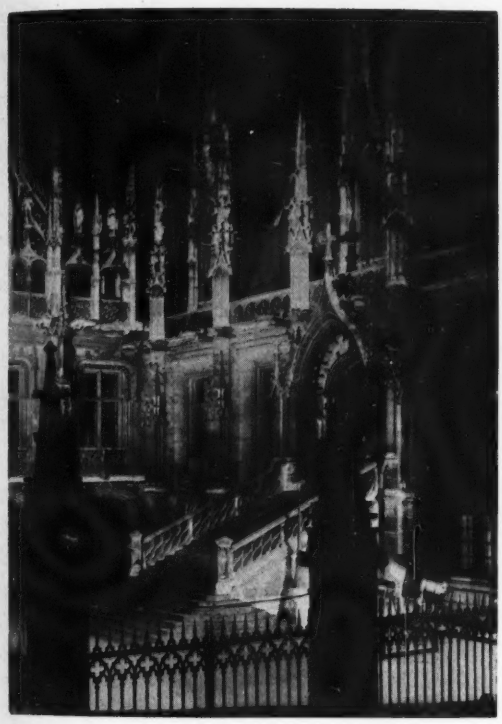


Fig. 6. Palais de Justice, Rouen, floodlighted.

Leaving Paris at 5 o'clock in the afternoon they travelled to Rouen and were taken for a tour of this historic city, the principal buildings of which had been specially illuminated for the occasion Figs 4-6). This formed a fitting conclusion to yet another of the now lengthening series of international congresses on illumination.

"Black Light" at the Golden Gate

Lighting of a spectacular character is being planned for the Golden Gate International Exposition, to be held in San Francisco Bay during 1939. According to *Signs*, £100,000 is to be expended on a lighting scheme, designed to make this island site (the largest island ever made by man) into a "City of Magic, a gleaming jewel afloat upon a sea of light."

The general design will be dominated by a central tower, 400 ft. high, which will be brilliantly illuminated at night.

One novel feature is the extensive use made of "black light," i.e., invisible ultra-violet radiation, to excite fluorescent materials. This idea is to be used particularly in connection with transformation effects. Thus, a gigantic map, occupying 5,000 sq. ft. of space, is to picture the whole existing activities of the vast interconnected network of power plants in the eleven Western States. Developments now installed will be visible under ordinary lighting. But by flooding the map with ultra-violet light, developments of the immediate future will also be revealed. The idea is to be adopted in other exhibits; for example, in a display of a home safely and adequately wired for its load. A turn of the switch will bring into view a condition of amateurish, unsafe wiring, and another turn will show the home, apparently in flames, as a consequence.

The Control of Light with Louvres

In view of the interest being taken in this country in the use of louvres in fittings, attention may be drawn to a recent paper on this subject by W. E. Folsom (Trans. Illum. Eng. Soc., U.S.A., July, 1937), in which a variety of applications of the system are discussed. The fundamental idea of using louvres is to make possible directional lighting with a minimum of glare. The author discusses the application of the system to luminous panels, cornices, and ceiling domes, as well as to fittings of conventional design. The intention of the louvres should be achieved with a minimum obstruction of light. There is, therefore, room for considerable skill in the selection of dimensions and shape of the louvres as well as the intervals between them.

Mr. Clifford C. Paterson Honoured by Birmingham University

Mr. Clifford C. Paterson has had conferred on him by Birmingham University an honorary degree of Doctor of Science "in recognition of his many contributions and services to electrical science."

Dr. Paterson, it will be recalled, established and administered the electrotechnic and photometry divisions of the National Physical Laboratory prior to 1918, when he accepted the task of initiating the G.E.C. laboratories at Wembley, of which he is still director. He was president of the Institution of Electrical Engineers in the year of the Faraday celebrations, and has presided over various other bodies and is this year president of the Institute of Physics.

To our readers, however, he is known mainly for his personal work in the field of lighting and for the generous expenditure of his time and effort in connection with bodies interested in this field. He is a past president of the Illuminating Engineering Society and of the International Illumination Commission, and is also chairman of the Illumination Research Committee of the D.S.I.R.

Professor H. B. Dates Elected President of the Illuminating Engineering Society (U.S.A.)

We learn that Professor Henry B. Dates, Professor of Electrical Engineering at the Case School of Applied Science, Cleveland. has been elected president of the Illuminating Engineering Society (U.S.A.).

Professor Dates has held his present position since 1905. Previously he spent two years with the Westinghouse Electric and Manufacturing Company, and he has also filled various academic appointments. He has worked on various committees of the Illuminating Engineering Society (U.S.A.), such as those on Lighting Legislation, Industrial and School Lighting, etc., and he took a leading part in the development of the "Better Sight" lamp for students, the design of which has won general approval.

Professor Dates is also—we note with pleasure— a member of our own Society. His name will also be familiar to many of our readers as one of the joint authors of "Illuminating Engineering" (edited by Cady and Dr. Dates). We wish him every success during his term of office, which commences on October 1.

NOVEL ISOCANDLE DIAGRAMS

by

G. F. Freeman, M.Sc. (Eng.), A.M.I.E.E., A.M.I.Mech.E.

In the representation of the candle-power distribution of an asymmetric light-source by drawing isocandle curves on a two-dimensional plan, it is desirable to consider carefully the uses to which such a diagram may be put, in order that the most favourable form may be selected consistent with ease of preparation, cheapness of production, and intelligibility.

The first and most obvious use is in the estimation of the candle-power in any given direction. The net or graticule, to give it its proper name, may for this purpose be a plain, rectangular grid, equally divided in latitude and longitude; all bearings may then be read off with equal ease. An important secondary use, however, is in the computation of lumen outputs, whole or partial; for this, it is necessary that the graticule, which represents a spherical surface, shall be *equivalent*; i.e., areas on diagram and sphere must correspond. This requires that the areas enclosed between successive parallels of latitude shall reduce in the ratio of the cosine of the latitude, measured geographically from the equator. (In isocandle diagrams the latitude is commonly measured from the South Pole.) In addition, areas enclosed between successive meridians must all be equal.

All this is well known, but of the various projections which satisfy the conditions, only one—Flamsteed's projection—has been used to any extent for isocandle diagrams. In this, the parallels of latitude are equally spaced parallel straight lines; the meridians must then be sine curves. The representation is satisfactory near the equator, but approaching the poles, not only are the meridians crowded, but they are inclined to the parallels at considerable angles at the outer edges, producing unpleasant distortion.

Another projection, used by Waldram, is the equivalent cylindrical projection. In this, the meridians and parallels are straight and rectangular; the diagram is easily constructed and satisfactory, except near the poles, where the cosine reduction cramps the latitude scale to an undesirable extent.

The graticules here suggested employ Lambert's equivalent azimuthal projection, used by cartographers in the representation of large areas on account of its relatively small distortion. It appears in two main forms. In the polar form, in which a pole is at the centre of the diagram, the meridians are straight lines radiating from the pole at their natural angles, and each parallel of latitude is a circle concentric with the pole at a radius $r = \sqrt{2}\ R \sin\ \theta/2$, where R is the radius of the equator circle and θ the isocandle latitude. This diagram is readily drawn with ruler and compasses.

The equatorial form, however, which is commonly used for the representation of the world in hemispheres, has certain advantages where printed blanks are available. Its meridians and parallels are curves which are readily derived from the polar form by making use of the relations:

$$\cos\ \theta_p = \sin\ \theta_e \cos\ \phi_e$$
$$\tan \phi_p = \sin\ \phi_e \tan\ \theta_e$$

in which the suffixes p and e denote corresponding polar and equatorial bearings respectively, as illustrated in Fig. 1.

For comparison, a particular distribution relating to a bisymmetric street-lighting refractor, based on

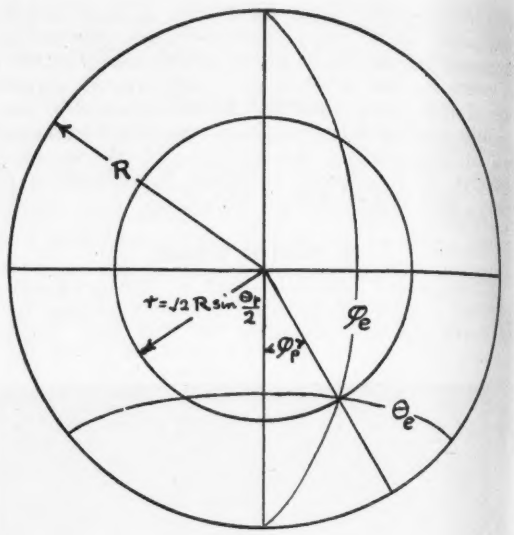


Fig. 1.

data kindly supplied by the Wardle Engineering Company, Ltd., has been plotted on the ordinary Flamsteed projection (Fig. 2), the polar projection (Fig. 3) and the equatorial projection (Fig. 4). In each case the diagram has the same area, and the portion enclosed in heavy lines corresponds to one-quarter of a sphere (π units of solid angle). It will be noticed that the distortion in Figs. 3 and 4 is nowhere very serious, and that interpolation may

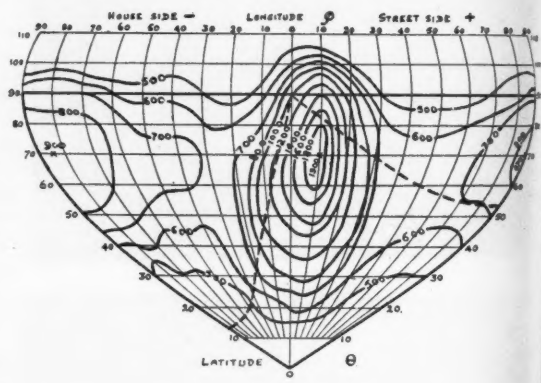


Fig. 2.

be made anywhere with comparative ease. In Fig. 3 the meridians and parallels intersect at right angles and, indeed, this diagram is very convenient in use once one is accustomed to its unfamiliar shape.

It is sometimes desirable to plot "street lines" on isocandle diagrams in order to judge the effectiveness of the distribution in a chosen location. Such lines (heavy broken) are shown on all three projections for a light source 25 ft. from the ground.

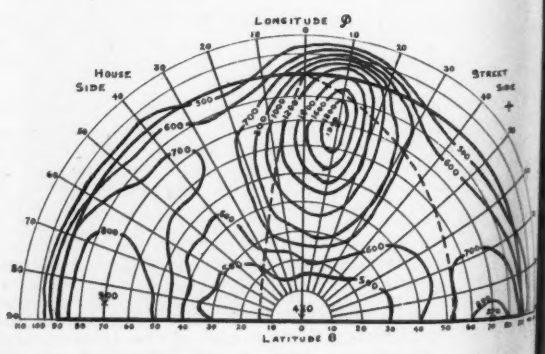


Fig. 3.

overhanging a 40-ft. street by 6 ft. On the equatorial projection they are radii of the bounding circle and subtend the same angles to the vertical as do points on the kerb immediately opposite to the fitting. This is a distinct practical advantage of this projection.

It may be thought that the preparation of the graticule for the equatorial projection is laborious, but where printed tracing blanks are used (and their adoption is essential if much work is to be done) this objection is trifling. Suitable blanks to sample in non-curling tracing paper, quarto size, cost little more than one halfpenny apiece in lots of 1,000.

Finally, whenever isocandle or isobrightness diagrams are required, it is well to bear in mind that Flamsteed's projection, although widely used, is not a *sine qua non*, and to recognise that any *legible* projection will serve for interpolation and any *equivalent* projection for flux summation. That most appropriate to the purpose may then be selected.

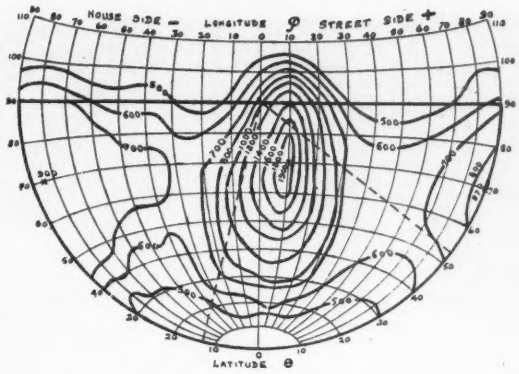


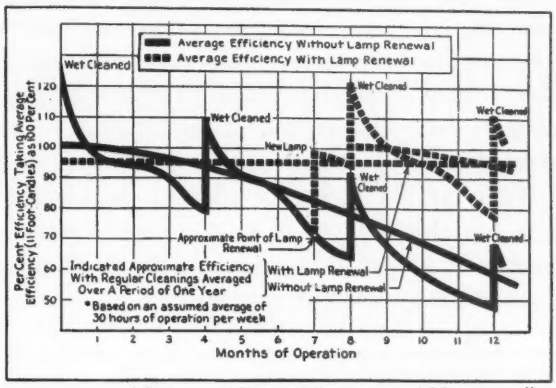
Fig. 4.

Illumination and the Works Engineer

In a talk given to the I.E.S. Local Centre for the North-Western Area on March 23, Mr. W. A. Thurley, of Mather and Platt, Ltd., emphasised the importance of the task of the works engineer, whose duty it is at once to satisfy everyone's requirements and to keep within his maintenance budget. He is not infrequently called upon to undertake extensive replanning of sections of lighting installations owing to the rearrangement of furniture or machinery or structural changes in the building. In this connection Mr. Thurley illustrated a method of lighting, adapted to answer, with very slight alterations, for any probable rearrangement of desks in an office. The system provided for general lighting with 150 watt lamps in dispersive reflectors, furnishing 4 foot-candles, supplemented by individual 15 watt desk lamps, giving an average of 25 foot-candles in a 3 ft. circle. In the interests of safety the pressure for the local unit was reduced to 25 volts. Another opportunity for local lighting is afforded by drawing boards for which adjustable units have been designed. The difference in the requirements of a tracer or a draughtsman drawing fine lines with a hard pencil was pointed out. Other slides illustrated the lighting of milling machines, turret lathes, etc.

Mr. Thurley next gave his experience of lighting with electric discharge lamps, explaining that patience was sometimes necessary to induce the workers to make a fair trial of this unfamiliar light. An installation in a boiler yard, where 400 watt units mounted 22 ft. high produced an illumination of 10 foot-candles, was described. The substitution of these units for gas-filled (filament) lamps had enabled the illumination to be doubled and had saved more than 200 units of electricity per week. Similar good results had followed the installation of discharge lamps in the brass foundry. One very important point is that the gain in efficiency—2½ times that of the gas-filled lamp—enables illumination to be increased in cases where the submains are not big enough to permit of the current being very materially increased—thus saving the maintenance engineer from expenditure on new wiring. Yet another installation, a new foundry, illustrated how lamps could be arranged on different phases so as to minimise the stroboscopic effect.

In the concluding portion of his address, Mr. Thurley discussed maintenance problems, in which connection he presented the accompanying diagram. There is apt to be some misunderstanding regarding the work of the maintenance engineer. His work does not consist merely in keeping lighting units and surfaces clean, in replacing burnt out lamps, and suchlike routine operations. It includes the adoption of ways and means of keeping the lighting up to date and a recognition of the fact that our


Average Efficiency Without Lamp Renewal
Average Efficiency With Lamp Renewal
Wet Cleaned
New Lamp
Approximate Point of Lamp Renewal
Indicated Approximate Efficiency With Regular Cleanings Averaged Over A Period of One Year
With Lamp Renewal
Without Lamp Renewal
*Based on an assumed average of 30 hours of operation per week
Per Cent Efficiency Taking Average Efficiency (at Foot-Candles) as 100 Per Cent
Months of Operation

[*Courtesy : "Factory Management and Maintenance."*

present day levels of interior illumination are much below those that may be prevalent a few years hence. This situation is recognised by maintenance engineers, many of whom are making provision for an additional capacity of 50 to 100 per cent. in the future.

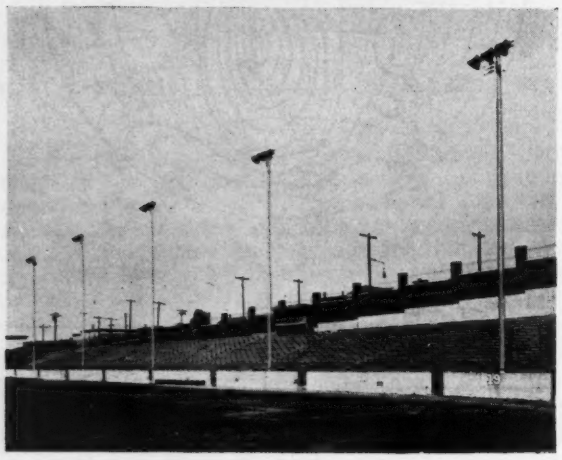
Some Recent Gas Lighting Installations

At the meeting mentioned above, Mr. S. H. Packer, of the City of Manchester Gas Department, showed several slides illustrating typical modern practice in industrial gas lighting.

The first of these was the letterpress machine shop of a firm of lithographic and letterpress printers, where 23 lamps fitted with 3 lt. No. 2 cluster burners consuming 9 cub. ft. per hour, a loose reflector, and a special closed in globe were installed. With Manchester gas of calorific power 450, this unit gives 217 mean horizontal c.p. and 20.6 candles per cub. ft. The units were mounted 4 ft. above the machines and provided 13 foot-candles. The installation had answered well and the average renewals of mantles were only 8 per annum.

Other jobs described included the warehouse of a firm of packers (161 lamps) and a factory containing sewing machines working on ladies' overalls (50 lamps, one to every two machines) in which 20 foot-candles was provided.

Outdoor Games by Night



A day view showing lighting units on high masts.

A night view showing the field brilliantly illuminated.

That night baseball and football games in America have not only been made possible by floodlighting but have also been made much more popular and more profitable than day games is constantly being demonstrated. Recognition of floodlighting by the National League in America and its authorisation for a certain number of League games to be played at night has also resulted in an increased number of requests for information concerning the floodlighting of athletic fields and public parks.

Superintendents of public and high schools throughout America state that their night football and softball games show average increases of some 800 per cent. to 1,000 per cent. over the receipts for games played during the day. It is becoming increasingly apparent that people do not have the time to attend day games that they did in the past, and that they welcome the opportunity to indulge their love of sport at night. The illustrations show the floodlighting of a football ground in the United States.

Lighting a Greyhound Racing Track

Application of Beuttell's Method

In a recent paper read by Mr. F. C. Kelly before the Illuminating Engineering Society of Australia (N.S.W.), an effort was made to apply the system of analysis for determining the necessary value of illumination, described by Mr. A. W. Beuttell in his well-known paper. (Illum., Eng., Lond., Jan., 1934.)

The various factors were considered in turn. The first of these, reflection factor, might relate to the dog itself, the track surface, or the contrasting colour of the jacket worn by the dog. By consideration of these items a contrast figure of 0.4 was assumed as the minimum, and a multiplying factor, for difference in reflection factors, of 2.5.

The object, the size of which has to be studied, might well be the jacket pattern or number, subtending 2.5 to 3.5 minutes at the eye when viewed at the longest range. This gives a factor of 2. A racing greyhound at top speed attains forty miles per hour. Relative movement would therefore be ranked as "fast" if the viewing distance was at all short, but for the conditions under review "medium" grouping seemed more correct, and a multiplying factor of 2 was therefore selected.

The final consideration, that of emphasis, would involve, for "average attraction," a factor of 1.5 and for "special effect," a factor of 2.

Multiplying the basic illumination of one foot-candle by each of these factors in turn we obtain 1 x 2.5 x 2 x 2 x 1 = 10 foot-candles, which becomes either 15 or 20 foot-candles according to the degree of emphasis desired. It was ultimately decided, in the absence of any past experience, to aim at "special effect" and to plan the installation for 20 foot-candles. The remainder of the paper, as summarised in the Australian Engineer, contains a full account of the design of the installation to afford this value.

The paper is most interesting as an instance of an application of the Beuttell system of analysis in a distant land—apparently with quite satisfactory results.

Lighting in the Confectionery Trade

A recent contribution prepared by the Committee of the Illuminating Engineering Society (U.S.A.) concerned lighting for special industries, and deals with conditions in the confectionery business. Although the processes in making chocolates and sweets are largely automatic in the case of the finer forms of confectionery, care and skill are needed in securing the necessary "finish," and correspondingly good conditions of illumination should be available. In the original article (Trans. Illum. Eng. Soc., U.S.A., May, 1937) examples of faulty and damaged fondants, which mar the appearance of a box and would probably not have escaped detection by adequate illumination, are reproduced.

The newest aid to industrial efficiency

Crompta Electric Discharge Lamps provide a clear revealing light which permits night work in factories, garages, etc., to be carried on under daylight conditions. Crompta Lamps give sharp definition of detail without shadows or dark spots. They are, therefore, invaluable also for street and flood-lighting. This improved lighting efficiency is coupled with a remarkable economy in current consumption. Other special features of Crompta Lamps, which lighting engineers will appreciate, are uniformity of life and quicker starting. Wattages: 80, 125, 250, 400. Write for full particulars to

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Consider, too, the mental reaction of lady customers towards harsh lighting.

The above illustration shows a typical example of good restaurant lighting, carried out on the modern G.V.D. System. Restful, even, shadowless, imparting an atmosphere which simply invites relaxation.

The cornice lighting and soffit panels in the alcoves provide ample light for general purposes; when desired, however, the large laylight may be switched on to flood the room with light, whilst spotlights in the centre can be brought into action for cabaret and other special attractions.

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Light in Daily Life

(VIII) Light and Entertainment

Entertainment through the Eye and the Ear—"All the World's a Stage"—Light in the Theatre—Artificial Firmament and Cyclorama—Stage Effects—Projection of Scenery—The Appeal of the Film—Films in Natural Colours—Apparent Solidity—Must the Audience sit in Darkness?—Outdoor Pageants and Spectacles—Museums and Picture Galleries—Artificial Lighting for Games and Sports—Why not an Indoor Stadium?

Entertainment, like knowledge, may be obtained by the eye or by the ear, or by both. Both, doubtless, contributed to the earliest forms of entertainment, the legend narrated round the camp fire, simple forms of music and primitive dances. But on the whole it must be conceded that the eye has played the dominant rôle in entertainment, and that its contribution has continually increased in importance during recent years.

"All the World's a Stage."

One of the earliest and most widespread forms of organised entertainment was the stage. It is significant that almost from the beginning the stage grasped the essential elements of correct artificial lighting—the principle that the *effect* of the source of light should be seen but not the source itself; hence the use of footlights that masked the candles and oil lamps from the eyes of the audience. In connection with lighting, as in other senses, it is true that "all the world's a stage," for this same principle is at the root of all successful applications of light for purposes of illumination.

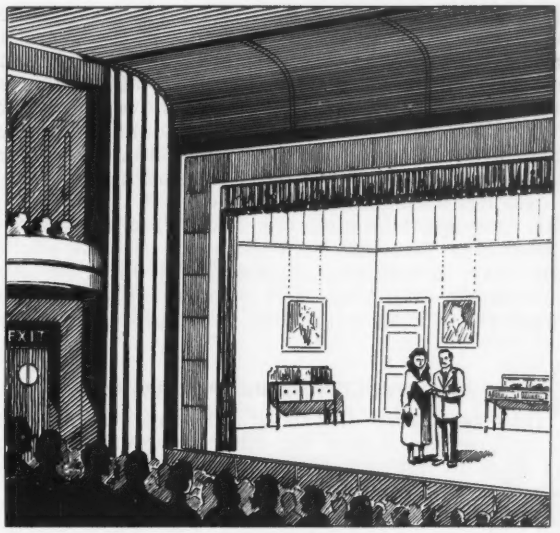
The primary aim of the lighting on the stage is to reveal the scenery and the actors; it should be such that the figures and faces of the actors are clearly revealed, and their expressions easily seen. Even this simple need demands considerable ingenuity if the play of features is to be accurately revealed without the presence of distorting shadows.

But the lighting, of course, achieves far more than this. It can serve to emphasise the face and figure of an actor, to pick them out from surroundings so that the attention of the audience is more easily held. It can serve to create on the stage an atmosphere in keeping with the motive of the play so that the ground is prepared for the main effect, the spoken words of the actor ("the play's the thing"). It can be intensified or altered to induce a different mood in the audience—as in the brief interludes in Shakespearean tragedy where the scene passes from grave to gay.

The Appeal to the Eye.

In the legitimate drama the lighting, very properly, is regarded as secondary to the play itself. But the quality of the appeal to the eye in dramatic productions varies greatly. Plays comparatively poor in design or action have been redeemed by the splendour of scenic effects, to which the lighting largely contributed. In some cases, where the entertainment is frankly a spectacle rather than a play, the appeal to the eye becomes the predominant item.

Recent improvements in illuminants have enormously enhanced the possibilities of displays of this kind. It is not only that the higher efficiency and greater power of modern sources, such as the recently introduced electric discharge lamps, enables light to be used on an unprecedented scale. For the first time we have available pure coloured light in bulk. The only serious drawback to these gaseous sources is that their intensity cannot be controlled and varied so readily as in the case of filament lamps. With arc



lamps, filament lamps and discharge lamps all available the stage electrician is completly equipped to satisfy any need.

Artificial Firmament and Cyclorama.

Parallel with advances in illuminants there have been notable changes in method. Whilst the spot light will always remain a necessary implement for purposes of emphasis, there is, in general lighting, a tendency towards softer effects such as are furnished by diffusion of light. The use of the "artificial firmament" which affords indirect lighting of a quality resembling that from the natural sky, is a special case. Wonderful effects may be obtained from the modern "cyclorama" apparatus affording a bright background, which can be varied at will in regard to brightness and colour. It is of special value for the production of scenic display and when a silhouette effect is desired.

The production of "effects," apart from the illumination of stage and actors, is again aided very greatly by modern apparatus. Stage illusions in which light plays a part are endless. Of special interest are the apparent changes in faces, garments or scenery produced by variation in the quality of coloured light playing on selected coloured materials and the use of fluorescent materials glowing in various colours when exposed to invisible ultra-violet light.

Projected Scenery.

The use of projectors to imitate snow, rain or hail is familiar. The degree of resemblance attained is, however, much greater than in the past. Similar methods produce the illusion of moving smoke and flame. A most fascinating development is the use of apparatus to project actual portions of the scenery, as in the presentation of Valhalla at Covent Garden last year. It is indeed not impossible that scenery may in the future be produced, on occasions, by the projection of special lantern slides in projectors designed to produce any combination of colours the producer may desire. The possibility of thus stocking, within a box of quite moderate dimensions, the scenery equipment for half a dozen operas is intriguing. The chief difficulty would appear to be the cost of the giant projecting apparatus, which in the case of a large stage, is so great as to be regarded as prohibitive.

The Appeal of the Film.

It is a remarkable illustration of the latent capacity of the population for entertainment that the continued existence of the legitimate stage should be possible, parallel with the widespread appeal of the films, now adapted to entertain the ear as well as

the eye. This revolution in technique was effected with marvellous speed. An instance of the overcoming of unexpected difficulties is to be found in connection with the use of arc lamps in taking films at the studio, for which these sources have special advantages. When the recording of sound as well as light was first attempted it seemed that the use of arc lamps would have to be discontinued. Their occasional hissing and splutter, even if trifling to the ear, were apt to be magnified in the film. It is understood, however, that by the use of suitable chokes and other precautions, this difficulty has now been completely overcome. The future of the cinema theatre is still an interesting subject for speculation.

Natural Colours and Perspective.

How far television can be incorporated in the entertainment, and how far other improvements such as films in natural colours and with improved perspective will become usual, remains to be seen. It is stated, however, that there is now no real technical difficulty in connection with the display of pictures in natural colours, the chief problems being of a financial nature. We are even promised that an approach to apparent solidity of figures and objects on the screen may be ultimately obtained, though here possibilities seem more limited. Already it is surely sufficiently uncanny to be able to see on the screen the features and to hear the voices of those who have passed away. How much more remarkable if ultimately perfection of colour and apparent solidity of form are attained—so that touch remains the only sense unsatisfied!

The question, put at intervals ever since the cinema became a factor in daily life, as to whether it is really necessary for films to be shown in complete darkness had recently been raised anew. A minute amount of light in the auditorium is usually demanded by authorities in the interests of safety and order; but to all intents and purposes the room is in darkness whilst the film is being shown, and attendants have to make use of torches in order to guide people into their seats. The query does not seem to be raised so often in connection with theatres —perhaps because the audience remain continuously in their seats during an act, and the entry of newcomers is unusual—but the point applies to both forms of entertainment.

MUST the Audience Sit in Darkness?

Is it really in the interests of the entertainment that the surroundings should be quite so dark? In the case of the theatre the practice is traditional. It can be hardly imagined that a low order of illumination throughout the auditorium would appreciably distract the audience or interfere with their concentration on the performance. (After all, the crowds who watch football matches have no such aid to concentration, and seem to be able to keep their attention on the match without undue difficulty.)

In the case of the cinema theatre there is the special consideration that an undue amount of light in the auditorium, if it reached the screen, would impair the picture. There is no difficulty in showing, however, that a value of illumination such as would suffice to enable to make surroundings quite sufficiently visible (perhaps one tenth of a foot-candle) could be provided without the picture suffering. Indeed, in the opinion of some authorities, the effect would be improved—for the great contrast between the bright screen and the dark surroundings is not the most favourable conditions for prolonged and concentrated vision. The fatigue would doubtless be lessened, and the sense of ease enhanced, if the area bordering of the screen were of moderate brightness, say one tenth to one fifth of that of the screen, and the average brightness of the walls and ceiling in the auditorium of a lesser brightness, say one fiftieth to one hundredth of the screen brightness.

Lighting of Open Air Spectacles.

In the case of spectacles viewed in the open air by day (football matches, cricket matches, pageants, etc.) the audience are illuminated to approximately the same extent as the display, which is possibly a drawback, though it might be suggested that a somewhat less intense concentration on the part of the audience is sometimes not a bad thing. Certainly anyone who has been fortunate to see a play in the Open Air Theatre in Regent's Park on an agreeable sunny afternoon is not likely to feel any grievance in this respect. When the performance takes place with the audience under cover the area of display is usually more brightly illuminated than the area where watchers are seated (the centre court at Wimbledon is a good example in this respect). On the whole, however, it may be admitted that in the case of some events, pageants particularly, the effect is often finer by night, when floodlighting can be used and the contrast enhanced. An ideal condition is perhaps furnished when such spectacles happen to be viewed by strong artificial light in fading daylight. Floodlighted buildings often show to best advantage in these circumstances.

Museums and Picture Galleries.

In museums and picture galleries the same principles apply. Here, however, the fault is usually in the other direction, i.e., the illumination on the objects viewed does not sufficiently exceed the general illumination in the room. It has often been urged that the ideal plan in picture galleries would be for the pictures to be brightly illuminated and for the people viewing them to be situated in subdued light. This is in some degree achieved by the latest methods of design. In certain natural history museums in the United States excellent effects have been obtained by mounting stuffed animals in front of scenery and with a foreground resembling that in their natural environment, the whole exhibit being skilfully illuminated by concealed sources in such a manner as to give the correct impression of distance and perspective. It need scarcely be said that the impression of a group so arranged is very much finer than when animals are merely arranged in glass cases, with no special background or surround, and receiving only the natural illumination available in the room.

Artificial Lighting for Games and Sports.

A very important and comparatively new case of lighting for entertainment is furnished by artificially illuminated games and sports. The problem needs consideration, both from the standpoint of players and spectators. For the former, especially amateurs who are engaged in their vocation during the day, it is naturally a great advantage to be able to play such games as lawn tennis by artificial light. It is chiefly during the winter period that this privilege is valuable. Yet it must be confessed that in this country temperature and climate, in addition to lack of light in winter, do not favour outdoor pastimes by night. Lawn tennis, bowls, and cricket practice, therefore, are best played under cover during winter nights, provided the expenditure is not prohibitive.

Football, baseball, and other games which require a great deal of space and are almost necessarily played out of doors, have been staged by night on floodlighted grounds and with fair success. The expenditure necessary to furnish the lighting for these large areas is considerable, but by no means prohibitive where a good "gate" may be expected.

The writer, however, is inclined to doubt whether such events will ever be really popular. Cold and mist interfere too much with the comfort of spectators. Present methods of illuminating the playing

area by "floodlighting" are not completely satisfactory. All such efforts suffer from the fundamental difficulty that during the night we have a black sky. This gives an impression of unreality, leads to a dark-adapted condition of the eye, and does not afford a desirable degree of diffusion of light. The illumination is necessarily very much less than that during the day. Even more important is the fact that the light comes from a few isolated bright points, so that players are never completely illuminated from all directions. One lacks the desirable background, and even a slight mist tends to produce a luminous haze which veils the motions of the players.

Why Not an Indoor Stadium?

But if the staging of outdoor games and athletic events by night, as a regular feature, appears somewhat problematical, there is a better case to be made out for indoor performances. If it be assumed that a covered stadium of the requisite dimensons could be built most of the difficulties become less formidable and substantial advantages appear. Conditions under cover at night are much more comfortable for both players and spectators. Interference by weather conditions is reduced to a minimum. The lighting problem becomes much easier. Rain and wind can be excluded. Even mist and fog are less serious in an interior—especially if electrostatic clearing of the atmosphere were developed. The roof could be designed to admit natural light during the day, but to serve as an artificially illuminated firmament by night. All surroundings would be finished in light colours which help to diffuse the light and present advantageous backgrounds. By adopting indirect lighting of this kind one can approach nearer to conditions during the day and avoid the great drawbacks of floodlighting in the open.

If a suitable artificial substitute for grass—possibly a rubber composition—could be found there is no reason why football as well as athletic events and races should not be staged in such an arena. The success of dog-racing has shown that there is available a public anxious to witness sporting events by night, when almost everyone is free. Football matches played under such conditions would be substantially free from the uncertainties of weather and surface—which so often cause disappointment in the open. Constant conditions and certainty of play would be ensured. It should be realised that even when weather does not prevent games being played in the open in winter, visibility is often extremely poor. (The University Rugby football match, played in December, is notorious in this respect.)

The expense of such a stadium would doubtless be great, but it could be used almost continuously for varied events, so that an excellent load factor should be assured.

Public Lighting with Gas

The annual report of the Bradford Gas Department states that the quantity of gas used for street lighting purposes was 251,267,000 cubic feet. The number of lamps in use was 12,944, as compared with 12,842 a year earlier; 10,650 lamps have been converted to automatic control, and the conversion of the remainder will follow very shortly.

Newcastle-upon-Tyne Lighting Committee has recommended that gas should be retained for the improved lighting needed on the Grandstand-road.

The Margate Town Council has entered into contract for gas lighting in a part of the district under its control. The standard of lighting is to be improved.

Droitwich Town Council has decided to light the new St. Peter's Crescent housing estate by gas, and to lay gas on to the 265 houses on the estate.

The Hinckley Urban District Council has decided to improve the street lighting of Barwell at a cost of £623.

At a meeting of the Oundle Urban District Council it was decided to accept the tender of the gas company for street lighting for five years, and to ask that a number of additional lamps be provided during the coming season.

The New Romney Town Council has accepted the gas company's tender of £238 14s. 10d. for public lighting for the next three years.

Recent contracts for gas lighting included those at Crewkerne (ten years), Earls Barton (seven years), Heath Cuckfield and Lindfield (three years), and Portnockie (three years).

The New Factory Act

On July 30 the Royal Assent was given to the new Factory Act, which, it will be recalled, for the first time, includes a statutory requirement of adequate and suitable lighting in factories and workshops.

A Sign for a Bathing Pool

This novel Claudgen installation for the County Borough of Brighton is erected on a tower surmounting the entrance and pay-office of the Black Rock Bathing Pool. The representation of a diving-girl is carried out in 15 mm. red neon tubing, and the new Claudgen 7 mm. high-intensity tubing, the high intensity tubing being used for the bathing cap and swimming costume portions of the design. The total height of the diving-girl is 12 ft. Three rings of 20 mm. Cleora fluorescent tubing No. 25, lime green, are fitted round the top of the tower, the diameter of the largest ring being about 7 ft.

Better Street Lighting

Notes on a recent Conference arranged by the E.L.M.A. Lighting Service Bureau

Electric Discharge Lamps—Visibility and Revealing Power—The Lighting of Bends and Roundabouts—Disadvantages of Central Lighting—A Film of Street Lighting—Developments in the United States—The Cost of Good Street Lighting.

STREET LIGHTING PROGRESS IN PRESTON.

A recent development in Preston has been the extension of the existing lighting with Siemens "Sieray-Dual" electric discharge lamps. 300 and 500-watt lamps of this type for some hundreds of points are being provided. The picture shows a view of Fishergate Hill, where this method of lighting has recently been installed. A special feature of the Sieray-Dual lamps is the good appearance of colours, a manifest advantage where posters, etc., are displayed. "Proud Preston" has reason for pride in this effort to bring their public lighting thoroughly up-to-date.

At the Conference arranged by the E.L.M.A. Lighting Service Bureau in May last an introductory address was given by Sir Charles Bressey (M.O.T. Highways Development Dept.), who emphasised the importance now attached to good street lighting and the interest being taken in the work of the M.O.T. Committee, whose final report should not now be long delayed. Sir Charles also alluded to Section 6 of the Trunk Roads Act (1936) which empowers the Minister to provide or improve street lighting.

A paper by Mr. J. N. Aldington reviewing the development of filament and electric discharge lamps followed, and was illustrated by numerous demonstrations. Subsequently, a film illustrating the variety of factors influencing visibility in artificially lighted streets was shown, Mr. G. S. Lucas providing a running commentary. Amongst the lessons clearly illustrated were the importance of lighting the outer part of the kerb, the need for a lamp opposite a branch road and at the apex of a fork, and the special requirements necessary for efficient illumination at cross-roads and roundabouts.

Some similar points were touched upon later in an address by Mr. J. M. Waldram, who remarked that, in defining visibility, a distinction should be drawn between the general appearance of a lighted road and the ability of an installation to reveal objects on the roadway. He emphasised the paramount importance of mounting height in the elimination of patchiness and the drawbacks of too great overhang which prevents the kerb being well defined, and may also result in dark patches. He, too, regarded the indication of bends in the road as most important. Central lighting, he said, was apt to result in bright and uniform light down the centre of the road, but darkness at the sides; also, the kerb-lines were not well picked out and junctions did not get sufficient light. For wide and double carriageways the lighting should be carried out as if there were two roads. Wide roads can rarely be lit really well either from the side or from the centre.

Other interesting points were raised in the discussion by Mr. E. C. Lennox, who pointed out that lighting a residential street for the pedestrian and lighting a main traffic way for the motorist are quite distinct problems. Mr. Lennox also suggested that it was time some indication should be given as to where discharge lamps and tungsten filament lamps were respectively most suitable.

In the last session of the conference, Mr. W. J. Jones, manager of the Bureau, who had recently returned from a two-months' tour of America, said that England was at present ahead in street lighting. This lead, however, might not be retained unless an effort was made to see that the standards attained on certain main roads were made general. In America the effect of poor lighting in causing accidents had received close study. Wider use would probably be made of electric discharge lamps in the U.S.A. At the present time there were more of these lamps in use for the lighting of British roads than on the roads of all the rest of the world put together!

In his concluding remarks, Mr. Jones dealt with costs of street lighting, quoting some figures for the installation of electric discharge lamps in St. Pancras (London). There the average capital cost of supplying and erecting the unit, inclusive of column, bracket, etc., is £34 12s. 9d. The complete maintenance cost per lamp for the year is £4 6s. 8d. The average cost of electricity per lamp (at 0.532d. per unit) for 3,940 lighting hours is £3 9s. 10d. The total average cost for maintenace and electricity is £7 16s. 6d. per annum.

The following data showing the division of costs (for 400-watt electric discharge lamps spaced 150 ft. apart; 4,000 hours' use per annum; energy at 1d. per unit, and 3.5 per cent compound interest on capital over ten years), are also of interest:—

Energy	46.3 per cent.
Lamps	26.5 per cent.
Capital	17.3 per cent.
Maintenance	9.9 per cent.

Why ELECTRIC street lighting is best

MAINTENANCE

* Even the single aspect of saving in maintenance costs justifies the widespread increase in the use of electricity for street lighting
* Electric lamps maintain their high efficiency for the whole of their standard length of life
* The optical adjustment of electric fittings retains its correct setting because it is not interfered with by lamp replacements or cleaning
* In electric light there is nothing to cause corrosion—not enough heat to discolour glassware or to destroy reflecting surfaces or mirrors
* Only exterior cleaning is necessary as no ventilation is required for electric light, so that the interior fittings remain free from dirt
* All this means that a lamp attendant can manage many more lamps
* Most lanterns are designed to take two or more sizes of lamps, so that larger lamps can be fitted in existing lanterns without adjustment expenses whenever increasing traffic makes it desirable
* Automatic control from central points is easily arranged. There are several methods of control to choose from, some especially designed for air-raid precautions

For further information apply to the British Electrical Development Association, 2 Savoy Hill, London

Literature on Lighting

(Abstracts of Recent Articles on Illumination and Photometry in the Technical Press)

(Continued from Page 197, July, 1937)

II.—PHOTOMETRY.

202. Photometry of Gaseous-Conduction Lamps.

L. B. Johnson. Am. Illum. Eng. Soc. Trans., 6, pp. 646-664, June, 1937.

The problem of the photometry of discharge lamps is discussed with particular reference to the mercury vapour lamp. An outline of the methods of measurement, including the integrating sphere, is given. J. S. S.

203. The Use of Colour Filters in Visual Photometry.

W. F. Little and R. S. Estey. Am. Illum. Eng. Soc. Trans., 6, pp. 628-645, June, 1937.

The selection of colour filters for heterochromatic photometry can be made by means of a co-ordinate colour diagram. Particular cases are discussed, and errors peculiar to this branch of photometry are described. J. S. S.

204. Graphical Methods for Determining the Illumination Produced by Luminous Surfaces.

J. Ondracek and A. Gouffe. R.G.E., Vol. 41, No. 26, pp. 811-821, June 26, 1937.

Gives a description of a graphical method for determining the illumination produced on different planes by large luminous surfaces. W. R. S.

III.—SOURCES OF LIGHT.

205. Production of White Light by Electric Discharge in Xenon.

Anon. R.G.E., Vol. 41, No. 23, pp. 721-722, June 5, 1937.

A condenser discharge through xenon tubes of 2 mm., 10 mm., and 20 mm. diameter, at a pressure between 2 mm. and 6 mm. of mercury, has produced a very white light; it is stated that under favourable conditions of pressure and tube diameter the spectrum is sensibly continuous. W. R. S.

206. Luminescence.

J. M. Aldington. El. Rev., Vol. CXXI., No. 3,111, p. 42, July 9, 1937.

Discusses the use of chemical compounds, often containing definite small amounts of impurity, for the colour modification of radiation from discharge lamps by phosphorescence or fluorescence. Maintenance of luminous efficiency and stability of luminescent compounds are discussed. R. G. H.

207. Electric Discharge Stroboscopic Tube.

Anon. El. Times, 91, p. 457. April 1, 1937.

Gives photographs and circuit diagrams of a stroboscopic tube. It is claimed that the absence of thermal lag in the tube allows very high definition to be obtained. W. R. S.

IV.—LIGHTING EQUIPMENT.

208. Glass to Moderate Glare and Heat from Windows.

L. T. Sherwood. Am. Illum Eng. Soc. Trans., 6, pp. 665-686, June, 1937.

The merits and shortcomings of various types of glasses in reducing heat and glare from sunlight are discussed. J. S. S.

209. Effect of Luminous Intensity of the Sensitivity on Photoelectric Counters.

Anon. R.G.E., Vol. 41, No. 24, p. 761, June 12, 1937.

Prolonged exposure to high intensities may reduce the sensitivity of photoelectric cells. The effect of this is discussed. W. R. S.

210. Another Better Sight Aid.

C. E. Egeler. Light VI., No. 6, pp. 38-39, Summer, 1937.

Vacuum cleaners are now provided with lamps a few inches above ground level. Light distribution data with resulting illumination values are given. C. A. M.

V.—APPLICATIONS OF LIGHT.

211. Light and Architecture.

Anon. Am. Illum. Eng. Soc. Trans., 6, pp. 609-612, June, 1937.

Some representative architectural lighting schemes are described with photographs. J. S. S.

212. Methods of Evaluation of Utilisation Factors.

A. Vallat. R.G.E., Vol. 41, No. 23, pp. 715-721, June 5, 1937.

The reproduction of the text of a report presented to the International Congress (Paris). Various important theoretical and practical methods of determining utilisation factors are discussed. W. R. S.

213. Industrial Processes and Lighting.

D. M. Warren and A. K. Gaetjens. Light, VI., No. 6, pp. 18-25, Summer, 1937.

Brief descriptions are given of numerous industrial lighting installations, with particulars of processes, lighting equipment, and illumination value, together with photographs. C. A. M.

214. Lighting for the Cleaning and Pressing Industry.

M. W. Ross. Am. Illum. Eng. Soc. Trans., 6, pp. 613-627, June, 1937.

Methods of lighting suitable for cleaning and pressing plants are discussed, and special equipment is described. The different processes are treated in detail. J. S. S.

215. Modernising an Entire Office Building.

H. H. Webb and C. J. Fuhrmann. Light, VI., No. 6, pp. 5-8, Summer, 1937.

An interesting feature of this lighting scheme was the use of bi-post lamps in indirect fittings, as a result of low head room. Photographs are given. C. A. M.

216. The Mural Room.

W. E. Folsom. Light, VI., No. 6, pp. 32-33, Summer, 1937.

Details, with sectional diagrams, are given of cornice lighting equipment in an hotel in Dallas. C. A. M.

VITAL-
TO PERFECTION
IN GAS LIGHTING
Absolute resistance to extreme heat and impinging flames—effective diffusion of glare with little stoppage of light—exceptional protection for mantles—rare natural beauty and decorative charm. Such are the qualities essential to all-round efficiency in gas lighting. Only in Vitreosil Lighting Ware is this combination to be found.
VITREOSIL
GAS LIGHTING WARE • HEAT CANNOT CRACK IT •
A LARGE VARIETY OF TASTEFUL DESIGNS AVAILABLE
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THE THERMAL SYNDICATE LTD.,
Head Office & Works: Wallsend, Northumberland.
London Depot: 12-14, Old Pye St., Westminster, S.W.1

217. Philadelphia Drill Hall.

J. H. Rich. Light, VI., No. 6, pp. 16-17, Summer, 1937.

A brief description is given of the improved lighting and general appearance of a drill hall with a tanbark-covered floor. C. A. M.

218. Coronation Illuminations.

Anon. El. Times, 91, p. 823, June 10, 1937. El. Times, 91, p. 875, June 17, 1937.

A further selection of Coronation illumination photographs, with descriptions. W. R. S.

219. Paris Exhibition.

Anon. Elect., 118, pp. 839-841, June 25, 1937.

A brief description, with photographs, is given of numerous lighting effects at the Paris Exhibiton. C. A. M.

220. Luminous Advertising.

G. R. Lawall. Light, VI., No. 6, pp. 14-15, Summer, 1937.

Full details are given of an installation of built-up, luminous-panels for facia lighting. C. A. M.

221. The Television Exhibition.

Anon. El. Rev., Vol. CXX., No. 3108, p. 918, June 18, 1937.

A description of the exhibition of television apparatus at the Science Museum, South Kensington. R. G. H.

Visual Acuity and Test Letters

A number of interesting points are raised in a paper on the above subject by W. R. Coates, which appears, with the discussion, in the Transactions of the Institute of Ophthalmic Opticians. One fundamental question is the desirability or otherwise of using letters such as Snellen type in tests of vision. May one not be testing visual ability rather than visual acuity, and do not mental qualities enter into the test? The author, however, after prolonged tests of different systems, seems to prefer the use of letters, though care should be used in selection to limit the so-called "mental factors." Primary visual acuity tests, such as are involved in the study of designs, were considered unsuitable for general practice owing to the strain imposed on the observer. It must be remembered that in ordinary life one has usually only to glance at an object for a second or so in order to recognise it; prolonged inspection of objects difficult to see soon becomes wearisome.

In Lighter Vein

Departmental and staff bulletins do not come our way very often, though they are always welcome and frequently entertaining. A case in point is the bulletin of the Nottingham Corporation Gas Department for July, which contains a picture of the Nottingham Castle Gateway, floodlit during the Coronation festivities. Under the heading of "Main and Service Department" there are some amusing items, such as the note on the discovery of an old document revealing the purpose of a pipe laid to supply gas for balloons and on the more recent exploits of a certain Captain Spencer, who had remarks to make upon the poor "lifting power" of Nottingham gas. There is also some account of the strange experience of certain householders who were habitually served with hot water from the cold water tap—because an overheated electric cable ran in close proximity to the water service. Finally, let us gratefully acknowledge the comforting assurances given in a short article bearing the title, "The Qualities of Age."

Recent Patents

(Abstracts of recent Patents on Illumination & Photometry.)

No. 465,225. "Improvements in or Relating to Light Projectors, Particularly for Motor Vehicle Head Lamps."

Despatures, C. F. July 12, 1935.

This specification describes a light projector in which a paraboloidal reflector is divided in a horizontal plane into two parts, which slide along the axis relative to one another, and tilt independently about a vertical axis. The reflector, as a whole, may also be dipped.

No. 465,599. "Improvements in Inverted Incandescence Gas Lamps."

James Keith and Blackman Company, Limited, and Keith, G. November 8, 1935.

This specification relates to inverted incandescence gas lamps of the type having a body surmounted by a chimney or chimneys and accommodating an injector for delivering combustible mixture to a burner head carrying one or more mantles, and is particularly concerned with lamps having burners of the mitrailleuse type in which the gas and primary air traverse a bunch of tubes and the remaining air traverses the space around the tubes. According to the invention, one or more syphon tubes are disposed partly within and partly outside the chimney for thermally syphoning secondary air to the burner.

No. 466,040. "Improvements in or Relating to Means for Colouring Projected Light Beams."

Low, A. M. November 22, 1935.

This specification covers a method of colouring a projected light beam by the imposition of a liquid fan or splayed jet upon a translucent sheet disposed in the path of the beam and the partial or complete coloration of the main liquid jet by colours from supplementary and controllable jets. The liquid may be water and may be coloured by dyes or by suspended colouring matter.

No. 466,077. "Improvements in or Relating to Composite Light-Diffusing Sheets or Plates."

The Thermolux Glass Company, Limited, and Booth, R. July 17, 1936.

According to this specification a composite translucent diffusing sheet comprises at least a pair of transparent or translucent layers spaced apart and having between them a layer of light diffusing material consisting of very short lengths of filaments or rods the surfaces of which have a high polish. The filaments or rods may be of circular, tubular ribbon, cruciform or other cross section and may be quartz, glass or a gelatinous or resinous material.

No. 466,240. "Improvements in or Relating to Lamp Fittings."

Komor Henrik-Fele Fenytechnikai Villamossagi Es Muszaki Vallalat k.f.t. August 19, 1935. *(Convention, Hungary.)*

This specification describes a lamp fitting comprising a globe of matt glass and a surrounding reflector. The surfaces of the globe and of the reflector each have cross sections of wavy form comprising more than one complete undulation, so that light is repeatedly reflected between them in a zigzag fashion to assist in the uniform distribution of light over the surface of the globe.

No. 466,262. "Improvements in and Relating to Protective Glass Containing Neodymium."

Degea (Aktiengesellschaft) (Auergesellschaft). May 25, 1936.

According to this specification a protective glass, minimizing the transmission of ultra violet light, contains neodymium and an addition of vanadium sufficient to increase the total absorption, particularly in the ultra violet zone, and also an addition of de-colorizing material, such as cobalt oxide and either nickel oxide or manganese sesquioxide, which will remove or weaken the green discoloration caused by the vanadium.

No. 466,367. "Improvements in or Relating to Street Lamp Structures."

James Keith and Blackman Company, Limited, and Keith, G. March 7, 1936.

This specification describes a street lamp structure in which the lamp proper is suspended, while being hoisted and lowered, from a carriage which is movable along an inclined track to maintain the lamp clear of passing traffic. The standard is a gallows-like structure having an inclined track extending from the end of the gallows arm to a point upon the vertical member of the standard.

No. 466,503. "Improvements in or Relating to Electric Lamps Comprising Luminescent Materials."

The General Electric Company, Limited, and Randall, J. T. November 28, 1935.

The luminescent material in a lamp has, according to this specification, a matrix of cadmium silicate and manganese may be utilised as an activating impurity.

No. 466,551. "Improvements in Miners' Safety Lamps."

J. H. Naylor, Limited, and Smith, C. N. December 15, 1936.

This specification describes a safety lamp of the kind in which the wick is enclosed within a dome separated by an air space from the inner glass. The dome is mounted on a threaded spindle or the like so that it can be given a micrometric adjustment relatively to the lower edge of the inner glass to adjust the space for air flow to the flame.

No. 467,102. "Improvements Relating to Aircraft Lamps."

Joseph Lucas, Limited, and Gossling, C. E. December 10, 1935.

A landing light for aircraft of the kind which is pivotally attached at one side to a lamp housing in the body of an aeroplane or other craft, comprises, according to this specification, a pivoted arm carrying the lamp and an electric motor with reduction gearing, which may be epicyclic and frictionally controlled, associated with the pivot for moving into and out of its operative position.

MAZDA LIGHT TUBES
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WITH these new Mazda Light Tubes you can easily form any name or words required on an illuminated facia or sign. These Alphabet Mazda Light Tubes are made in 12" and 20" letters, and, of course, they can be connected and controlled in exactly the same way as standard electric lamps. There are six colours available, so that any surrounding colour scheme can be matched. It should be emphasized that the daylight value of signs or facias employing Mazda Light Tubes is equal to that of the most colourful painted signs.
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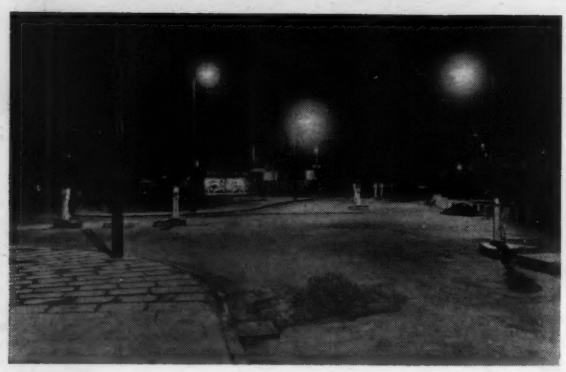
Lighting Extensions in Barking



The lighting in London Road extension, Barking, illustrated above, was carried out by Siemens Electric Lamps and Supplies, Ltd., to the instructions of Mr. W. E. Kidner, A.M.I.E.E., Borough Electrical Engineer of Barking, and is part of an extensive "Sieray" street lighting contract placed with that firm, the whole comprising some 250 points.

In the London Road extension the points consist of 400-watt "Sieray" type "H" lamps in bi-way lanterns, mounted on brackets fitted to the trolley-bus standards to give a mounting height to the centre of the light source of 25 ft. above the carriageway, and a projection of 6 ft. from the centre of the pole.

The control apparatus is housed in cast-iron boxes strapped to the standards.

The spacing, which is, of course, fixed by the pole positions, is approximately 120 ft., and the class of lighting Class D of the British Standards Specification for Street Lighting.

Electric Street Lighting

Kirkcaldy.—The main road to Sauchenbush, to form part of the projected ring road, is to be lighted by electricity.

Newcastle-on-Tyne.—Alternative schemes for adequately lighting the carriageway of the Redheugh and High Level Bridges are to be prepared. Until recently, when these two bridges were freed from tolls, the authorities had no control of the lighting.

Newcastle-under-Lyme.—The Borough Surveyor's scheme for the electric lighting of various roads has been approved and application will be made to the Ministry of Transport for the appropriate financial arrangements.

Wolverhampton.—Application is to be made to the Ministry of Health for sanction to borrow £15,000, to be expended on electric street lighting.

St. Pancras.—Better street lighting is to be provided in Swain's-lane, N.6, and in Calthorpe-street, W.C.1. For the former thirty-five electric lamps, giving an increased light output of 127 per cent., are proposed. In the latter, electric discharge lamps are to replace the existing system, and an increase of only 4s. per annum should enable a 245 per cent. increase in lighting to be provided.

Oldham.—The new Roundthorn Estate is to be lighted by electricity and the lighting of the Shaw and Rippenden roads has been noted for urgent attention.

Coventry.—The new electric discharge lighting system in White and Jesson streets was inaugurated on July 5. Twelve 250-watt mercury units have been erected on existing tramway standards. Similar lighting is to be installed elsewhere. Lanterns are mounted 25 ft. above the roadway.

Eastbourne.—In King's-drive and The Avenue eighty-five sodium discharge lamps in mirror type reflecting fittings have been installed, 25 ft. high, 150 ft. apart, and with 6 ft. and 12 ft. overhang. The scheme conforms to Class "D" (B.S.S.).

Hornsey.—Fifty-six electric discharge lamps are to be installed in Brecknock-road and Dartmouth Park Hill, Highgate, at a cost of £2,444.

Norham-on-Tweed.—In this small village, which has been paying £70 a year for paraffin oil lamps, electric street lighting will be in operation in September. Much better lighting will be provided at a cost of £40 per annum only.

I.E.S. Visit to Paris

September 17 to 21, 1937

Arrangements have now been completed whereby the party of members of the Illuminating Engineering Society visiting Paris in order to view the lighting of the Exhibition will leave Victoria Station at 11 a.m. on *Friday, September* 17, arriving in Paris at 6.10 p.m. the same day. Members will stay at the Hotel Astor (Rue d'Astor, near the Madeleine).

The party will return from Paris at 12.15 p.m. on *Tuesday, September* 21, arriving in London (Victoria) at 6.56 p.m.

These arrangements are in accordance with the preference expressed by almost all members approached for the longer visit, involving travel by day.

In these circumstances the *complete cost of the visit*, including first-class travelling, accommodation at the Hotel Astor, local taxes, transference from hotel to station and vice versa, and reservation of seats will be £8 18s. 6d. per person. (If second-class travelling and first-class on the steamer is preferred to first-class throughout, the above cost will be reduced by 17s. 4d. Where single rooms are required an additional charge per person of 6s. will be made.) These prices are subject to exchange fluctuations.

It is hoped that an address on the lighting of the Exhibition will be given on the opening evening. Apart from this event there will be no formal programme, and members will be free to make their own arrangements to visit the Exhibition and see other things of interest in the city.

All members desiring to take part in the visit should communicate with the Passenger Manager, Pickfords Travel Service, Continental Tours Dept., Chief Travel Office, 205-206, High Holborn, London, W.C.1, from whom coupons covering travel and accommodation may be obtained, and should also, if they have not already done so, inform the Hon. Secretary of the Illuminating Engineering Society, 32, Victoria-street, London, S.W.1, that they are proposing to join the party.

Whilst passports are not essential for British subjects for a week-end visit of this character, it is generally preferable to have them.

TRADE NOTES AND NEWS

A Miniature Spotlight for Picture Illumination

Spotlights are now coming to find many uses besides those on the stage and in the cinema studio. In shop-windows and for stalls at exhibitions they supplement the general lighting by "picking out" certain objects. The miniature G.E.C. spotlight here illustrated, which utilises a 12-volt 48-watt Osram projector lamp, finds a special use for picture illumination. It is, in itself, a compact bit of apparatus, with an overall length of only 7 in., and is furnished with diaphragms to make the beam of light coincide with the shape of the picture to be illuminated. It is most effective when concealed from view behind a curtain or pelmet, etc. All such display lighting gains in effect when "the works" cannot be seen.

Liverpool Sodium Lighting

An interesting lighting scheme has recently been completed in Bold-street, a busy shopping centre of Liverpool, under the direction of Mr. P. J. Robinson, City Lighting Engineer.

The existing Revo "Killdark" lighting units have been converted to accommodate a 90-watt "Philora" sodium and three 100-watt gasfilled lamps in each unit, the latter serving to "correct" the amber light of the sodium lamps. The sixteen units installed are centrally suspended on span wires, 27 ft. high, at intervals of 30 yards, over this 25 ft. wide carriageway.

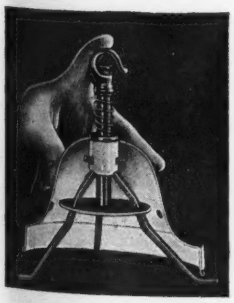
The results are considered excellent in view of the tarmac road surface. Even brightness and good visibility are secured. Photometric tests show a minimum illumination of about 0.32 foot-candles, a maximum of 1.38, and a diversity factor of approximately 4.3:1.

An Imposing Sales Conference

The above photograph was taken on the occasion of the recent successful Sales Conference organised by Benjamin Electric, Ltd., at Leamington Spa. Among those seated in the front row we observe five well-known members of the Illuminating Engineering Society (Mr. Guy Campbell, Mr. A. E. Iliffe, Mr. G. Herbert, Mr. Howard Long, and Mr. P. S. Barton), and there are a number of others, whose faces must be well known to many of our readers. Certainly a representative gathering. (In explanation of the imposing appearance of the party in evening dress we ought, perhaps, to explain that the photograph was taken immediately before the official conference dinner!)

The "Fast" Screwless Gallery

The new and simple principle embodied in the "Fast" gallery introduced by Messrs. Falk, Stadelmann and Co., Ltd., eliminates the conventional screw grip and yet ensures safe carriage and even balance of glass units with 4 in. and 6 in. diameter flanged necks. Amongst the advantages claimed for this device are: economy of time in fitting or removing glassware; elimination of danger of breakage due to expansion and contraction of glassware during heating or cooling periods; the mitigation of trouble due to slight variations in the dimensions and contours of flanges; the certainty of equal and even balance of the glass unit; and the fact that the unit cannot be released except by the calculated and definite depression indicated in the illustration.



The normal position of the support and the method of hold or grip for depression of spring.

Showing depression of spring for either fitting the globe or securing its release.

THE CORPATACT MANUFACTURING COMPANY beg to advise their numerous Clients that they are specialists in the manufacture of all types of Capacity Operated Switch Gear, and undertake the design and manufacture of Electrical Mechanical equipment requiring expert staff.

Specialists in Burglar Alarm equipment, manufactured under our own Patents. Enquiries invited. Capacity operated switches for Window Lighting.

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DIRECT DRIVE AND RATIO PATTERNS

Will not run back. No wheels to get caught in. Sizes to 10 cwt. smallest wall space, side or front driving, also special types including multi-division barrels, combined horizontal and vertical operation.

Sodium Lighting at St. Albans

We hear that one of the largest sodium lighting installations in the Home Counties is nearing completion at St. Albans, Herts. The roads at present lit are Victoria-street, Stanhope-road, and Hatfield-road radiating from the centre of the city, which is already lit by centrally suspended mercury discharge lamps. For two miles "Philora" 150-watt sodium lamps are used, and then 100-watt to the city boundary, the spacing in all cases being 150 ft. staggered, mounting height 25 ft. (width of roads 30-40 ft.), with 6-ft. projection brackets.

The illumination at test point is stated to be 0.16 foot-candles and under the fitting 0.9 foot-candles.

The fittings are of the Eleco "Sunway" cut-off type, in which the lamp is shrouded, dimpled mirror reflectors being used. These have two special features, in that a certain amount of light is "spilled" over the outside of the fitting so as to prevent the overhead "curtain" effect so often experienced with this type of fitting, and also a glass panel is fitted in the side of the fitting away from the traffic to increase the amount of light in this direction. One hundred fittings are at present installed, and the Council have given instructions for a scheme to be prepared for the lighting of other main roads in their district.

The "Sunway" fittings were manufactured by Engineering and Lighting Equipment Company, Ltd., the installation being planned by Mr. F. T. Negus, the City Engineer, in conjunction with the North Metropolitan Electric Power Cupply Co.

The "High-Low"

A new lamp bearing this description has recently been introduced by Messrs. Crompton, Parkinson and Co., Ltd. As the name suggests, it affords two ranges of illumination, the change being effected by merely pulling a silken cord. The opal lamp used, which consumes only one unit of electricity in 250 hours, is very economical, and provides just the degree of dim light with soft shadows required from a night-light in bedrooms and nurseries.

Mixed Lighting for Photographic Studios

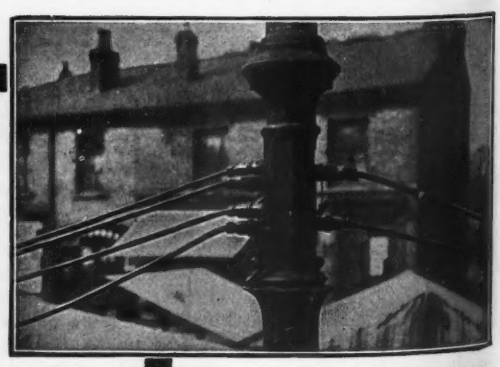
The possibilities of electric discharge lamps in photographic studios have been the subject of some study recently. We learn that in the experience of the G.E.C. the Osira lamp, the efficiency of which now stands at 45 lumens per watt, is proving very acceptable. For many purposes the colours of the light is not of great moment. Where, however, appearance of colours is important, e.g., when photographing on panchromatic film, a combination of a 400-watt Osira lamp with 200 to 600 watts of tungsten filament lamps answers well. Colour rendering is thus much improved, as the Osira lamp alone is too blue and the tungsten filament alone too red. A "fifty-fifty" Osira-tungsten mixture is still one and a quarter times as efficient as the tungsten lamp alone, and the special filter (increasing the exposure two to four times) commonly used with tungsten filament lamps becomes unnecessary.

MARKET LIGHTING

FOR some years we have been collaborating with supply authorities in devising temporary lighting installations for market stalls. The picture shows part of a "NIPHAN" market job, in which 6 sockets, in conjunction with a fuse board, were mounted on a lamp standard, with plugs leading to 3-way tees, and suspended through-sockets. ¶ *Our extensive market lighting experience is at your disposal.*

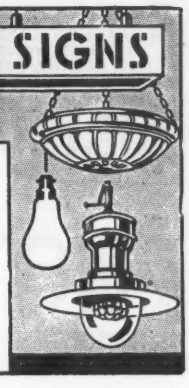
with the NIPHAN *system*

SIMMONDS & STOKES, LTD.,
Victoria House, Southampton Row, W.C.1.
Telephone: HOLBORN 8637. Telegrams: NIPHON, LONDON.



A "NIPHAN" market lighting installation showing main feeding sockets fitted to a lamp standard.

·WHERE TO BUY·
A DIRECTORY OF LIGHTING EQUIPMENT



We invite applications for spaces in this new section of the journal. Particulars of terms for each space (approx. 1 inch deep and 3¼ inches wide) are given below.

These terms are equivalent to **half our ordinary advertising rates**, but not less than 12 successive monthly insertions can be accepted on this basis, and amounts are payable in advance.

Payment for an advertisement in this section entitles the advertiser to receive *Light and Lighting* during the period of the contract.

Terms:					
12 Successive Monthly Insertions	£3 10 0	Payable
24 " " "	£6 0 0	in
36 " " "	£8 10 0	Advance

1

MODERN LIGHTING FITTINGS
New Catalogue on application
Fittings manufactured to Architects' Specifications
ASCOG LIMITED
Ascog House, 44, Theobalds Road, LONDON, W.C.1

2

PHOTOMETRIC EQUIPMENT for technical, lighting, and scientific research
ALEXANDER WRIGHT & CO., LTD.,
WESTMINSTER, S.W.1

3

ALLOM BROTHERS LTD.
16, GROSVENOR PLACE, LONDON, S.W.1.
Specialists in the Science of Modern Lighting, including:
Theatres and Public Halls. Tennis and Racquet Courts.
Pictures and Picture Galleries. Floodlighting, etc.
Decorative Fittings in Glass and Metal.

4

Take no risks— specify **BENJAMIN PLANNED LIGHTING**
THE BENJAMIN ELECTRIC, Ltd., TARIFF ROAD, N.17

5

MAZDA LAMPS and B T H LIGHTING EQUIPMENT
Our Illuminating Engineers will be pleased to advise you on any street or floodlighting problem
THE BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, W.C.2

6

BROMFORD
Seamless Steel Lighting Standards
for all requirements
BROMFORD TUBE CO., LTD., ASTON, BIRMINGHAM

7

THE REINFORCED CONCRETE LAMP COLUMNS SPECIALISTS.
CONCRETE UTILITIES, Ltd.
WARE, Herts.

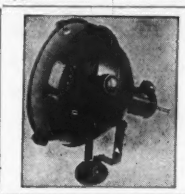
8

CRYSTAL CHANDELIERS
AND
SILVERED GLASS REFLECTORS
— DIRECT IMPORTERS —
PLEASE WRITE FOR CATALOGUE AND TERMS:
CRYSTAL & INDUSTRIAL FITTINGS Co., 72 Shoe Lane, Fleet Street, E.C.4.
Telephone: CENTRAL 7340

9

Curtis Lighting
COMPANY OF GREAT BRITAIN LIMITED
OFFICES: ALDWYCH HOUSE LONDON W.C.2.
WORKS: PONDERS END MIDDLESEX.
Manufacturers of **X-Ray Reflectors**

10



DAWSON REFLECTORS
Indoor and Outdoor Floodlights
JENA REFLECTOR FITTINGS
Miss E. H. DAWSON & HENCKEL,
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Telephone: Chancery 7751/2

11

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ARCHITECTURAL ILLUMINATION AND DESIGNS
DRAKE & GORHAM LTD.
36, GROSVENOR GARDENS, LONDON, S.W.1
Manchester, Glasgow, Hereford and Winchester.

12

TYPERLITE LOCAL LIGHTING UNITS ADAPTABLE TO ALL PURPOSES & SITUATIONS
Sole Proprietors and Patentees
ELECTRICITY SERVICES LTD.
ASK FOR CATALOGUE.
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Mansion House 5294 (3 Lines)

13

"ESLA"
BI-MULTI AND MULTIPLANE REFLECTORS
Lanterns, Brackets, Columns, Switches and Fuse Boxes, etc., FOR STREET LIGHTING
The Electric Street Lighting Apparatus Co.
The Foundry, Canterbury

14

VITREOUS ENAMELLING
(CAST IRON & M. S. SHEET)
Cooker parts, stripped & re-enamelled. Reflectors, Lanterns, etc., for industrial & Public Lighting.
ELM WORKS Ltd., Summerstown, S.W.17. Est. 1903.

15
ENGINEERING & LIGHTING EQUIPMENT CO. LTD.
SPHERE WORKS,
ST. ALBANS, HERTS.
TELE. 258
DISCHARGE LIGHTING
FITTINGS FOR ALL PURPOSES

16
PHOTOMETERS
PHOTO-ELECTRIC
BENCH, CUBE, STREET and PORTABLE TYPES
FOR CANDLE POWER AND ILLUMINATION TESTS
EVERETT EDGCUMBE Colindale Works LONDON, N.W.9

17
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TESTING LABORATORIES
All kinds of Lamps, Reflectors, etc., Tested
LAMPS TESTED TO B.S.S. No. 161, 1934
SCALE OF FEES ON APPLICATION TO THE SUPERINTENDENT
66, SOUTHAMPTON ROW, W.C.1

18
FLOODLIGHTING & FITTINGS
LTD.
294, GRAY'S INN ROAD, W.C.1
Manufacturers of "FLOOD" Units
Specialists in Modern Lighting Fittings
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500/1000 Watts
Model "B"

19

GOWSHALL LTD. for "Guardian Angel"
Illuminated Guard Posts & M.O.T. Signs.
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Head Office and Works
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20
THE GUNFIRE (Trade Mark)
PIONEERS of AUTOMATIC LIGHTING
GAS CONTROLLERS, ELECTRIC, and SYNCHRONOUS TIME SWITCHES
Manufactured by:—
BRITISH, FOREIGN AND COLONIAL AUTOMATIC LIGHT CONTROLLING CO., LTD., BOURNEMOUTH

21
Aldwych House, London, W.C. G·V·D Telephone: Holborn, 7277-8
FOR BETTER LIGHTING

22
"HAILWARE!"
BRITISH MADE ILLUMINATING GLASSWARE AND FITTINGS.
TRAFFIC GLOBES AND SIGNS, ISLAND COLUMNS AND FOOTLIGHTS,
HAILWOOD & ACKROYD, Ltd.
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31, Colmore Row, Birmingham.
Ulster Agents: Messrs. Bell & Hull, 17, College Street, Belfast.

23

Decorative, Architectural and Commercial Lighting Fittings and Equipment.
Harcourts
LIMITED
Stanhope Hse, 1 Kean St., Aldwych, London, W.C.2.
Telephone: Temple Bar 9671/2/3/4 H.L.50

24
EVERY TYPE OF MODERN
LIGHTING
BY
L. G. HAWKINS & CO., LTD.,
30-35, DRURY LANE, W.C.2

25
SCIENTIFIC Holophane TRADE MARK ILLUMINATION
The Hall-Mark of Good Lighting

26
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GAS CONTROLLERS AND ELECTRIC TIME SWITCHES.
FOR STREET LIGHTING AND INDUSTRIAL PURPOSES.
Manufactured by:—
THE HORSTMANN GEAR COMPANY, LIMITED,
NEWBRIDGE WORKS—BATH
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27
PROTECT YOUR SIGHT WITH KANDEM LIGHT
INDUSTRIAL, COMMERCIAL, STREET AND RAILWAY LIGHTING EQUIPMENT of Scientific Design and Superior Quality.
KANDEM ELECTRICAL Ltd.
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28

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Street Lighting Equipment
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29
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30

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31
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PROMOTERS OF SCIENTIFIC STREET LIGHTING BY GAS
Our Research Lighting Bureau will solve your problems
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32
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ILLUMINATING ENGINEERS
CINEMA & HOTEL LIGHTING SPECIALISTS
Designers and Manufacturers of Modern Lighting Fitments and Electrical apparatus
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33
RADIOVISOR PARENT, LTD.
28, LITTLE RUSSELL STREET, LONDON, W.C.1.
LIGHT ACTUATED APPARATUS
CONTROL OF STREET, FACTORY, AND SIGN LIGHTING.
SMOKE INDICATOR AND RECORDER.

34
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38-39, UPPER THAMES STREET, LONDON, E.C.4
ELECTRIC LAMPS of all types. "SIERAY" ELECTRIC DISCHARGE LAMPS. ELECTRIC LIGHT FITTINGS. FLOOD-LIGHTING APPARATUS. SHOP-WINDOW LIGHTING EQUIPMENT. STORE LIGHTING. INDUSTRIAL LIGHTING, CINEMA LIGHTING, ELECTRIC SIGNS, ETC.

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PLUGS, SOCKETS, TEES, COUPLINGS, TERMINAL SOCKETS AND JOINT BOXES
for every portable and temporary lighting requirement.
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36
WASK
PATENT SELF SUSTAINING
WINCHES
FOR ALL PURPOSES
Quick hoisting with little effort
MADE IN TWO SIZES
Walter Slingsby & Co. Ltd., Keighley

40
For every type of GAS LIGHTING
SUGG WESTMINSTER
When you want the best!
CHAPTER ST. S.W.1

41
"THORLUX"
"OVERLAMP" REFLECTORS
DISCHARGE OR GASFILLED LAMPS
SLIP-IT-ON SLIP-IT-OFF OVER THE LAMP FOR CLEANING
F.W. THORPE LTD. 39, BOLTON ROAD, SMALL HEATH, BIRMINGHAM.
FOR EASY MAINTENANCE - THE BEST

42
ULTRALUX
LIGHTING FITTINGS
TROUGHTON & YOUNG LTD.
143 KNIGHTSBRIDGE

43
20th Century
● STYLE LEADERS IN
● MODERN LAMPSHADES
20TH CENTURY ELECTRICAL
89-90 NEWMAN STREET, W.1.

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37
SORDOVISO
Silent Control of Electric Power
Sordoviso Relays and Contactors. Silent Bell Units. Mercury Switches. Staff Locating Systems. Flashers, etc.
SORDOVISO MANUFACTURING CO.,
72, Greencroft Gardens, LONDON, N.W.6. Tel.: Maida Vale 1725

38
STRAIGHT-LITE REFLECTORS, LTD.,
73, CANONBURY ROAD, LONDON, N.1.
REFLECTORS FOR CORNICES, SHOWCASES, SHOPWINDOWS & ALL TYPES OF CONCEALED LIGHTING. DIRECTIONAL SIGNS: MODERN FITTINGS AND ARCHITECTURAL LIGHTING UNITS.
Telephone: CANonbury 2066 (two lines).

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STRAND ELECTRIC
AND ENGINEERING Co. LTD.
SPECIALISTS IN COLOUR LIGHTING and STAGE EQUIPMENT
LIGHTING FOR EVERY OCCASION
THEATRES: EXHIBITIONS
FLOODLIGHTING: CINEMAS
BALLROOMS: PAGEANTS
19-24 FLORAL ST. LONDON, W.C.2

44
WARDLE ENGINEERING Co., Ltd.
OLD TRAFFORD, MANCHESTER, 16.
STREET LIGHTING EQUIPMENT. FLOODLIGHT PROJECTORS
WORKSLITE REFLECTORS. WARDELYTE GLASSWARE
PRISMALUX DIRECTIONAL UNITS.

45
"PHOTRONIC" Photo-electric
ILLUMINATION METERS
BY
WESTON

46
We invite Enquiries from Readers or Particulars of "Wants" such as might be satisfied by Advertisers in this Directory.

Fittings for Electric Discharge Lamps

In our last issue (p. 207) we commented on the variety of fittings for electric discharge lamps now available, as illustrated in a recent list issued by Benjamin Electric, Ltd.

We illustrate one more of these, the "Ile" reflector, which is specially designed for lighting petrol-

pump islands, railway platforms, walks and drives, etc. One would imagine that for this type of unit the performance as regards light distribution is rather improved by the substitution of discharge lamps, with their vertical luminous column, for filament lamps.

Catalogues and Advertising Literature

We invite all firms in the Lighting Industry to send us new catalogues as they appear, for reference in these columns

FALK STADELMANN AND CO., LTD.—"Electric Supplies," a comprehensive catalogue dealing with accessories, switches, cables, conduits, and fittings; also leaflets dealing with the Malvern floodlight, industrial reflectors, etc.

THE GENERAL ELECTRIC CO., LTD.—An illustrated catalogue dealing with church lighting; pictures of interior and exterior (floodlighting) installations are presented and suitable fittings are shown.

THE ELECTRICITY SUPPLY COMMISSION (S. AFRICA).—Fourteenth Annual Report presented to the Minister of Commerce, Pretoria; describes operations and developments in South Africa during the past year.

THE METROPOLITAN PIPE AND POLE COMPANY, LTD.—Catalogues illustrating "spun poles" for lighting standards, ferro-concrete tubular traction poles, etc.

PHILIPS LAMPS, LTD.—Philora Bulletin, illustrating floodlighting with sodium light for hotels, garages, coal storage places, etc.

REVO ELECTRIC CO., LTD.—Illustrated catalogue devoted to highway lighting with electric discharge lamps. Typical installations of mercury and sodium lamps are illustrated in colour and new equipment for use with "Philora" sodium lamps is described.

The ELECTRICAL REVIEW

FOUNDED 1872

The Complete Technical Journal

Gives practical information and authentic technical commercial news necessary to those who are concerned with the Production, Installation and Maintenance of electrical equipment, Generation and Distribution. Its advertisement pages constitute the most complete Buyers' Guide to all electrical products.

All those interested in illumination matters will find this journal of particular value in its description of fittings and material used in up-to-date installations, giving detailed descriptions of the equipment of important new buildings.

Certified Net Sales over 10,000 copies per week.

EVERY FRIDAY 6d.

Subscription:
United Kingdom £1 14 8 Canada £1 12 6
Other Countries £2 1 6 per annum, post free

ELECTRICAL REVIEW LTD.
Dorset House, Stamford Street, London, S.E.1.

Metrovick Autumn Sales Campaign

We have received from Metropolitan Vickers Electrical Company, Ltd., illustrations of the various show cards, box-signs, window displays, etc., to figure the forthcoming autumn sales campaign for Cosmos lamps. The campaign is to "tie-up" with a national campaign on the theme "Better Light Better Sight." A feature of several of the designs the "man of vision," who prefers Cosmos lamps, and who is evidently to figure prominently in the autumn campaign.

"LUX"
(La Revue de l'Eclairage)

WE have pleasure in announcing to our readers that we have entered into an arrangement to receive subscriptions for the French Journal "Lux" (La Revue de l'Eclairage). The subscription per annum is 30 francs, the approximate equivalent of which in English money is Seven Shillings and Sixpence (7/6).

"Lux" is the only French journal which specialises in all aspects of Lighting; it is the official organ of the Association Française des Ingenieurs de l'Eclairage (equivalent to the Illuminating Engineering Society in France).

It furnishes a complete record of interesting developments in lighting in France and on the Continent. It is fully illustrated and in particular devotes a considerable number of its pages to Decorative Lighting.

By studying these articles and the numerous photographic reproductions of modern lighting installations the reader can readily gain an excellent impression of French methods and practice in matters of Illumination.

Applications for subscriptions will be received by "Light and Lighting," 32, Victoria Street, London, S.W.1.

Class 'A' lighting with GAS

NEW STREET · BIRMINGHAM

Most of the best lit streets in the country are lit by gas. It is found that gas meets all modern needs of improved street lighting—pleasant colour characteristics, comparative freedom from glare, good visibility, even illumination, very low depreciation in candle power, economy, and freedom from breakdown.

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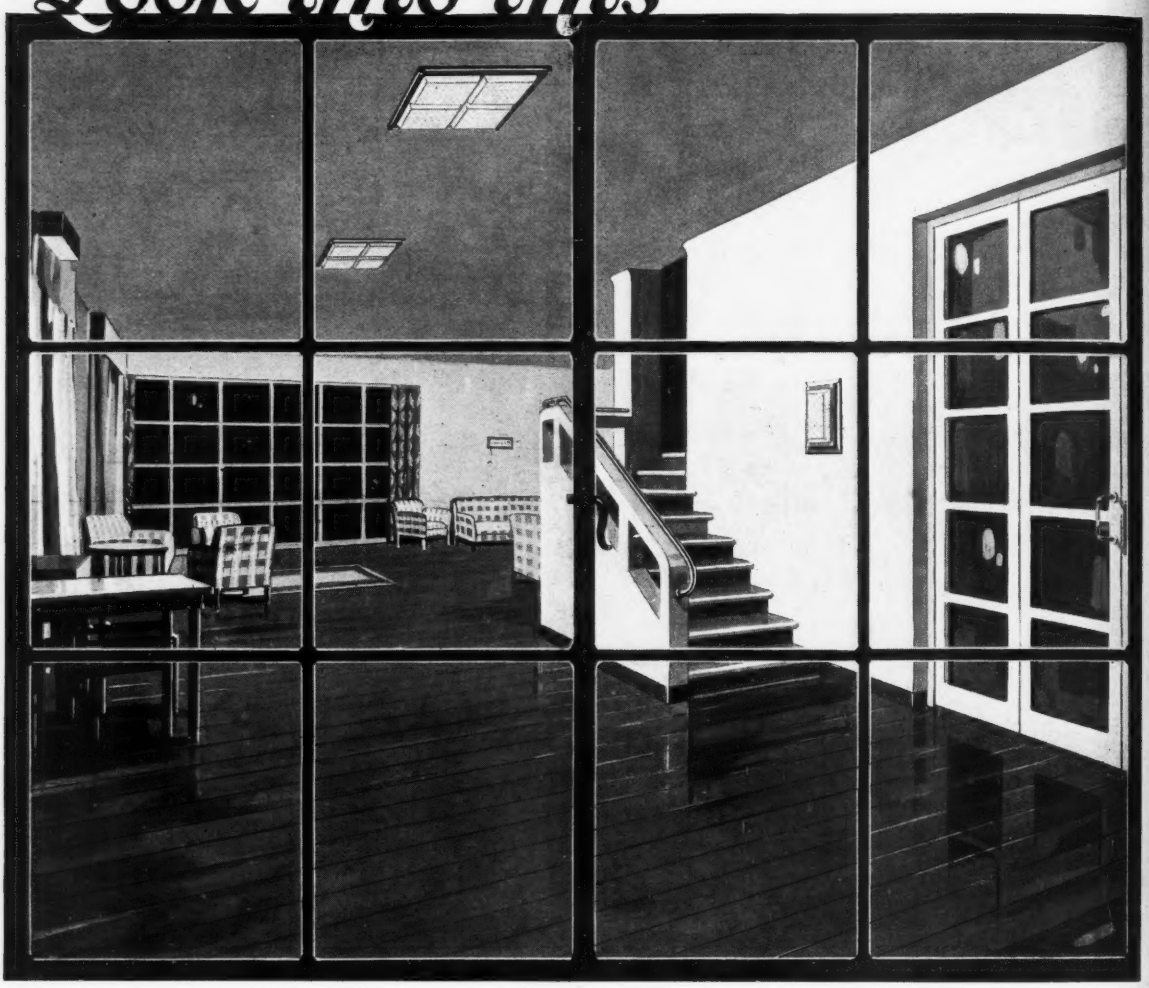

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